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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
**Bulletin 87**

# CULTURE OF THE ANCIENT PUEBLOS OF THE UPPER GILA RIVER REGION, NEW MEXICO AND ARIZONA

SECOND MUSEUM-GATES EXPEDITION

BY

WALTER HOUGH

*Curator, Division of Ethnology, United States National Museum*

WASHINGTON
GOVERNMENT PRINTING OFFICE
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BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

Issued March 21, 1914.

## ADVERTISEMENT.

The scientific publications of the United States National Museum consist of two series—the *Proceedings* and the *Bulletins*.

The scientific publications of the United States National Museum are intended primarily as a medium for the publication of original, and usually brief, papers based on the collections of the National Museum, presenting newly acquired facts in zoology, geology, and anthropology, including descriptions of new forms of animals, and revisions of limited groups. One or two volumes are issued annually and distributed to libraries and scientific organizations. A limited number of copies of each paper, in pamphlet form, is distributed to specialists and others interested in the different subjects as soon as printed. The date of publication is printed on each paper, and these dates are also recorded in the tables of contents of the volumes.

The *Bulletins*, the first of which was issued in 1875, consist of a series of separate publications comprising chiefly monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal work, reports of expeditions, and catalogues of type-specimens, special collections, etc. The majority of the volumes are octavos, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable.

Since 1902 a series of octavo volumes containing papers relating to the botanical collections of the Museum, and known as the *Contributions from the National Herbarium*, has been published as bulletins.

The present work forms No. 87 of the *Bulletin* series.

RICHARD RATHBUN,
*Assistant Secretary, Smithsonian Institution,*
*In charge of the United States National Museum.*

WASHINGTON, D. C., *February 13, 1914.*

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# CULTURE OF THE ANCIENT PUEBLOS OF THE UPPER GILA RIVER REGION, NEW MEXICO AND ARIZONA.

## SECOND MUSEUM-GATES EXPEDITION.

By Walter Hough,
*Curator, Division of Ethnology, United States National Museum.*

### INTRODUCTION.

The object of the Museum-Gates Expedition was to examine into the location, distribution, extent, and class of ruins in areas adjoining those already explored or partially explored by the United States National Museum, and during the two seasons' work which was made possible by the interest and liberality of Peter Goddard Gates, much of value was accomplished. The season of 1901 was spent in northeastern Arizona in investigations of ruins which had not been examined by Dr. J. Walter Fewkes in previous years, the results of which are published in the Annual Report of the United States National Museum for 1901. In 1905 the work was resumed and adjoining territory south of the White Mountains in Arizona and New Mexico, on the Blue, San Francisco, and Tularosa Rivers, was examined, thus connecting the work with that carried on by Doctor Fewkes and the writer in the region of the Upper Gila during the year 1897.

The results of the second Museum-Gates Expedition are perhaps even more important than those of the expedition of 1901. Of objective material the results comprise a collection of several thousand artifacts, and especially valuable because of its richness in perishable objects which had been preserved in caves or other protective situations. The study of this series in connection with the field notes, plans of sites, and natural history collections is expected to throw much light on an archeological area that has not heretofore been scientifically explored.

The general considerations concerning the geography and physiography, history, inhabitants, culture, and the distribution of the ruins of this region have been presented in Bulletin 35 of the Bureau of American Ethnology, Washington, 1907. Wherever possible, comparisons have been made with the customs of the actual Pueblos.

## ITINERARY.

The second Museum-Gates expedition party, consisting of P. G. Gates, Dr. Walter Hough, and Clancey M. Lewis, with Edward Gannett as teamster and guide, assembled at Clifton, Arizona, on June 8, 1905, and after outfitting, began the journey north, following San Francisco River. Small ruins were noted between Clifton and Carpenter, at the mouth of Blue River, and at the latter place the examination of several sites required a stay of three days. The heavy rains of the previous winter had obliterated the road along the San Francisco River, and for this reason it was decided to follow Blue River to its head, whence it would be easy to cross into the valley of the San Franciso. At J. H. Cosper's farm a stay of a week was made, and ruins in the vicinity, especially the great sacred cavern on Bear Creek, were thoroughly examined. This locality is the southern limit of the reconnoissance made by the writer in 1903. Two weeks were employed in the excavation of important ruins at Blue Post Office, on the land of Mr. Charles Martin. At this point Mr. Gates left the party, returning to Los Angeles, and shortly after his departure the camp was swept away by one of the cloud-bursts peculiar to this region, the members of the party narrowly escaping injury. On August 8, Luna, on the upper San Francisco River, in western Socorro County, New Mexico, was reached. Here the party stayed eight days, moving thence by the way of East Camp to the N. H. Ranch in the beautiful valley of Apache Creek. Large ruins in this neighborhood occupied the party for a week, when a move was made by way of Gallo Spring to Delgar's Ranch, near Joseph Post Office, in the Tularosa River Valley, where a stay of four days was made. Near the former site of Old Fort Tularosa, now Plaza Aragon, 12 days were spent in working in an interesting cave. From this place the party proceeded by forced marches northward across the Datil Mountains down Mangas Canyon to the Rito Quemado and the sacred Salt Lake of the Zuñi, arriving at Zuñi Pueblo on September 18. After a stay of three days here, the party reached the Santa Fe railroad at Gallup, New Mexico, on the 22d. having been in the field three and a half months.

## TULAROSA CAVE.

The Tularosa is a small tributary of San Francisco River, flowing southwest from its source in the Datil Mountains and emptying a few miles above Reserve Post Office, Socorro County, New Mexico. In its middle course it flows through a beautiful plain surrounded by mountains, and in its lower course traverses a deep canyon. Beyond the upper end of the valley, above the clear, rushing mountain stream, is a bold cliff of yellow tuff in which is a cave of moderate

dimensions, which at an earlier time formed the rear chamber of a row of stone houses built across its front and protected by the shelter of the overhanging cliff. Only a few courses of flimsy masonry marked the ground plan of the houses, all the rest of the structure being buried in the steep talus which slopes to the Magdalena road by the stream.

The cave was filled almost to the roof with débris, only a small portion of which had been disturbed by searchers who removed a desiccated body buried not far from the entrance. The material collected from the cave represents in greater part the domestic life of the people who lived in the stone houses.

It might well be true that in the earliest time the cave was a shelter for bear, and the well-packed mass of grass and leaves of plants over the irregular floor may have been the bedding of these animals. This mass is now packed densely and contains little of the personal effects of human beings; but instead of being the work of bears it may have been the couch of women and children, who in early Pueblo times slept deep in the shelter of the cave in the darkness behind the screen of houses, where the men held guard with bow never far from hand.

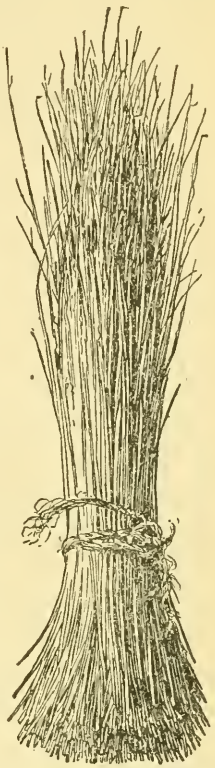

FIG. 1.—HAIR BRUSH FROM TULAROSA CAVE.

Subsequently the cave became more and more filled with discarded things, and different levels appear in the section. Thus at two different periods a portion, at least, of the cave was given over to the turkey pen and at another level there had been human inhabitation, and

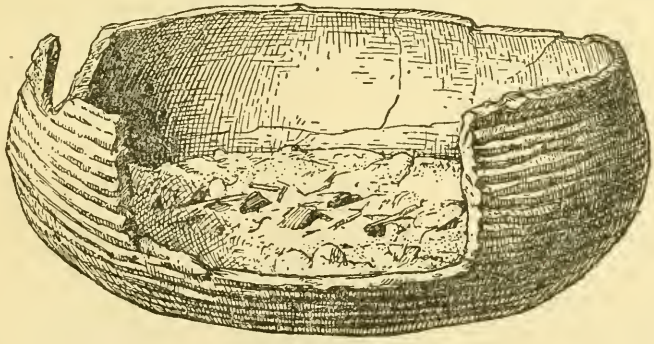

FIG. 2.—POTTERY FIRE VESSEL FROM TULAROSA CAVE.

a grass stem hairbrush like that of the present Pueblos (fig. 1) was found here. A fire pot (fig. 2, Cat. No. 256532, U.S.N.M.;

diameter, 7½ inches; height, 3½ inches), ashes, and other traces of fire were seen. In several parts of the cave were areas which had been burnt, but the fires had died out before extending very far. These fires could not be definitely assigned to periods previous to the presence of the white man in this region, but the presumption is that some of them were accidental during ancient occupancy of the cave. The fire pot, lined with ash cement, shows that precautions were necessary to prevent fire among the inflammable materials round about. Burials, of which there were apparently four, required digging down into the rubbish for the deposit of the dead, but these grave openings were begun at different levels as the rubbish accumulated, the lowest being that of a child (see pls. 27, 28), and the highest, that of an adult, whose remains are now in the collection of W. J. Andrus, of Hackensack, New Jersey. In clearing out the débris a round hole was found to have been excavated in the matted grass down to the bottom of the deepest portion of the cave, and which had subsequently been filled up. The walls of this hole were quite regular and the diameter about 2 feet. Nothing but rubbish was found in the hole, and it is impossible to say what it was used for. Loose and fixed stones and a few small bows and arrows and other offerings were encountered near a rock mass, according with the custom of locating shrines still observed by the present Pueblos.

In the immediate neighborhood of the cave still remain some marks of the industries of the inhabitants. In front of the cave is a considerable talus lying against the steep hillside, held in place to a great extent by the vegetation nourished in the rich soil. No pictographs or other artificial scarrings exist on the faces of the tufa cliff, as this is not an enduring material for preserving records of such character. At one side of the entrance is a splendid block of fine-grained gray rock on whose surface are regular oval shallow pits in which stone implements were sharpened.

The overhang above the cave is a breccia of basalt and tufa lined with mud nests of swallows, and formerly masses of this cliff have broken away, one large section having fallen into the houses and blocked the mouth of the cave.

## NATURAL HISTORY.

### MAMMALS.

The finds in the rejectage in the cave at the rear of the Tularosa cliff house shed much light on the extent to which animal life entered into the material culture of these ancients. Here were found, in conditions particularly favorable for their preservation, remains of the following mammals, identified by Dr. Marcus W. Lyon, jr.,[1]

[1] Mammal Remains from Two Prehistoric Village Sites in New Mexico and Arizona, Proc. U. S. Nat Mus., vol. 31, 1906, pp. 647–649.

DESICCATED TURKEY FROM TULAROSA CAVE.

FOR EXPLANATION OF PLATE SEE PAGE 5.

and of birds, identified by Dr. C. W. Richmond, of the United States National Museum:

Deer (*Odocoileus* sp.). Probably both the white-tailed and mule deer.

Pronghorn (*Antilocapra americana* (Ord). Fragments of skin and the entire skin of a young individual were found, the latter forming part of the wrapping around the desiccated body of an infant.

Bison or American Buffalo (*Bison bison* Linnæus). Various bones, a horn, and a small piece of skin forming the sole of a sandal, also cord twisted from the hair.

Rock spermophile (*Citellus grammurus* (Say)).

Marmot or woodchuck (*Marmota flaviventer* or *engelhardti?*).

Sonoran white-footed mouse (*Peromyscus sonoriensis* (LeConte)).

Rio Grande white-footed mouse (*Peromyscus tornillo* Mearns).

Wood rat (*Neotoma* sp.).

Pallid muskrat (*Fiber zibethicus pallidus* Mearns).

Jack rabbit (*Lepus* sp.).

Cottontail rabbit (*Sylvilagus* sp.).

Plateau lynx (*Lynx baileyi* Merriam).

Scott's gray fox (*Urocyon cinereoargenteus scottii* Mearns).

Common skunk (*Mephitis estor* Merriam).

Spotted skunk (*Spilogale* sp.).

Southwestern grizzly bear (*Ursus horribilis horriæus* (Baird)).

From Apache Creek, Tularosa River, come several skulls of Mearns coyote (*Canis mearnsi*), but no remains of the domestic dog were found in any of the sites, yet as cord made apparently of dog hair was found in the Tularosa cave, there is no reason to believe that this animal was absent from this region.

From the open-air ruin at Blue post office, Arizona, were recovered remains of deer, wood rat, jack rabbit, cottontail rabbit, cougar or puma, plateau lynx, Scott's gray fox, and the black bear.

It is evident, also, that the list does not comprise all the mammals made use of by the people who lived in Tularosa cave, since strips of skin worked into elements for weaving blankets and clothing, like the fur robes made at present by the Hopi, Ute, and many other far-western tribes and anteriorly by the eastern Indians, show pelage of a number of species.

BIRDS

Western red-tailed hawk (*Buteo borealis calurus*). A desiccated bird in down.

Merriam's turkey (*Meleagria gallopavo merriami*). A desiccated adult bird (pl. 1), parts of other individuals, desiccated chicks, and a number of eggs were found in a portion of the cave which was evidently a pen where turkeys were kept in captivity, there being great quantities of the droppings of the birds in the débris. The turkey

was most useful in furnishing feathers for the manufacture of warm clothing (for manufacture of costume see p. 71), much needed at this elevation, and were kept for the purpose like sheep at a later period. The discovery of ancient turkey compounds is mentioned by the earlier explorers in the Pueblo region, and Castañeda was presented at Acoma in 1540 with numbers of (turkey) "cocks with very big wattles."[1] Castañeda also mentions in his description of Pueblo life that "there are a great many native fowls in these provinces, and cocks with great hanging chins."[2] Mention is also made of the use of turkey feathers for clothing.

A foot, with leg bone attached, of a species of grackle (*Quiscalus*) completes the list of bird remains found in the cave, except feathers, which belong to a number of species identified by Mr. E. W. Nelson. The collections from this region show the importance of bird life in

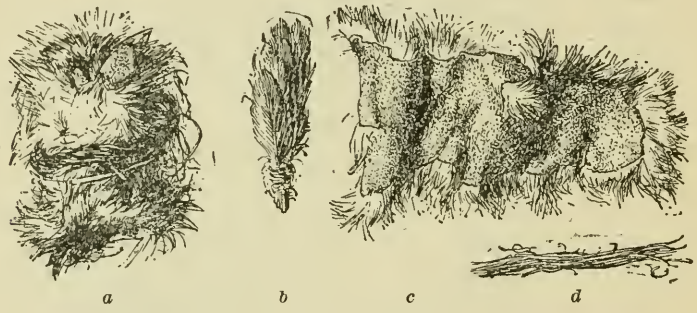


FIG. 3.—TRADE BUNDLE OF PARROT FEATHERS FROM TULAROSA CAVE.

domestic economy, costume, and religion. For the extent to which birds were known to the Pueblos one need but examine the ornithological vocabulary of the Hopi by Dr. E. A. Mearns, U. S. A.,[3] Dr. J. Walter Fewkes's description of the symbolism on Sikyatki pottery,[4] and Mrs. M. C. Stevenson's memoir on the Zuñi.[5]

Raven (*Corvus corax sinuatus*).

Bluebird (*Sialia mexicana* Baird).

Parrot (*Rhynchopsitta pachyrhynchus*). Feathers of this parrot were much prized (see fig. 3).

Big macaw (*Ara militaris*). This bird is not found farther north than extreme southern Sonora, and the feather must have passed into the hands of the Tularosa people through aboriginal commerce, which in Mexico, as Sahagun relates, was conducted by traders of feathers, etc., to distant places.

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[1] The Coronado Expedition, 14th Ann. Rep. Bur. Ethnology, p. 491.
[2] Idem, p. 521.
[3] Amer. Anthropologist, vol. 9, Dec. 1896, p. 391.
[4] Archeological Expedition to Arizona in 1895, 17th Ann. Rep. Bur. Amer. Ethnology.
[5] The Zuñi Indians, 23d Ann. Rep. Bur. Amer. Ethnology.

Jay (*Cyanocitta stelleri diadematа* and *Cyanocephalus cyanophalus*).

Flicker (*Colaptus cafer*).

Woodpecker (*Balana sphyra*). The scalp used for decoration among the California Indians.

A plume consisting of two jay feathers attached to a cord of wiry fiber of the yucca or dasylirion was found in the débris. The quills of the feathers are bent over and secured in a loop of the strand of cord and the latter was then twisted below the fastening into a two-strand string. One of the feathers appears to be cut, as in the feather symbolism of the Plains tribes (fig. 4, Cat. No. 246372, U.S.N.M.).

FIG. 4.—JAYBIRD PLUME FROM TULAROSA CAVE.

Sparrowhawk (*Falco sparverious phalæna*).

Snowbird (*Junco* sp.) and

Night heron (*Nycticorax nycticorax nævius*).

A trade bundle of parrot feathers, so prized by the Pueblo Indians, was found in the Tularosa cave. This very interesting relic of early commerce consists of a strip of wildcat skin, which forms the wrapping of a small bundle of the parrot feathers, which (fig. 3, *a*, *b*) were tied in a neat bunch with a fiber, inclosed in the skin (fig. 3, *c*), and secured with a cord of yucca (fig. 3, *d*). It is probable that these feathers were procured in the Huachuca and Chiricahua Mountains, where the thick-billed parrot has been known to range.

### OTHER ANIMALS.

Remains of the tortoise, lizard, and snakes were somewhat frequently found.

An interesting use of the iridescent thighs of the California fruit beetle (*Allorhina mutabilis*) for beads was observed in the Bear Creek cave.

### CORN.

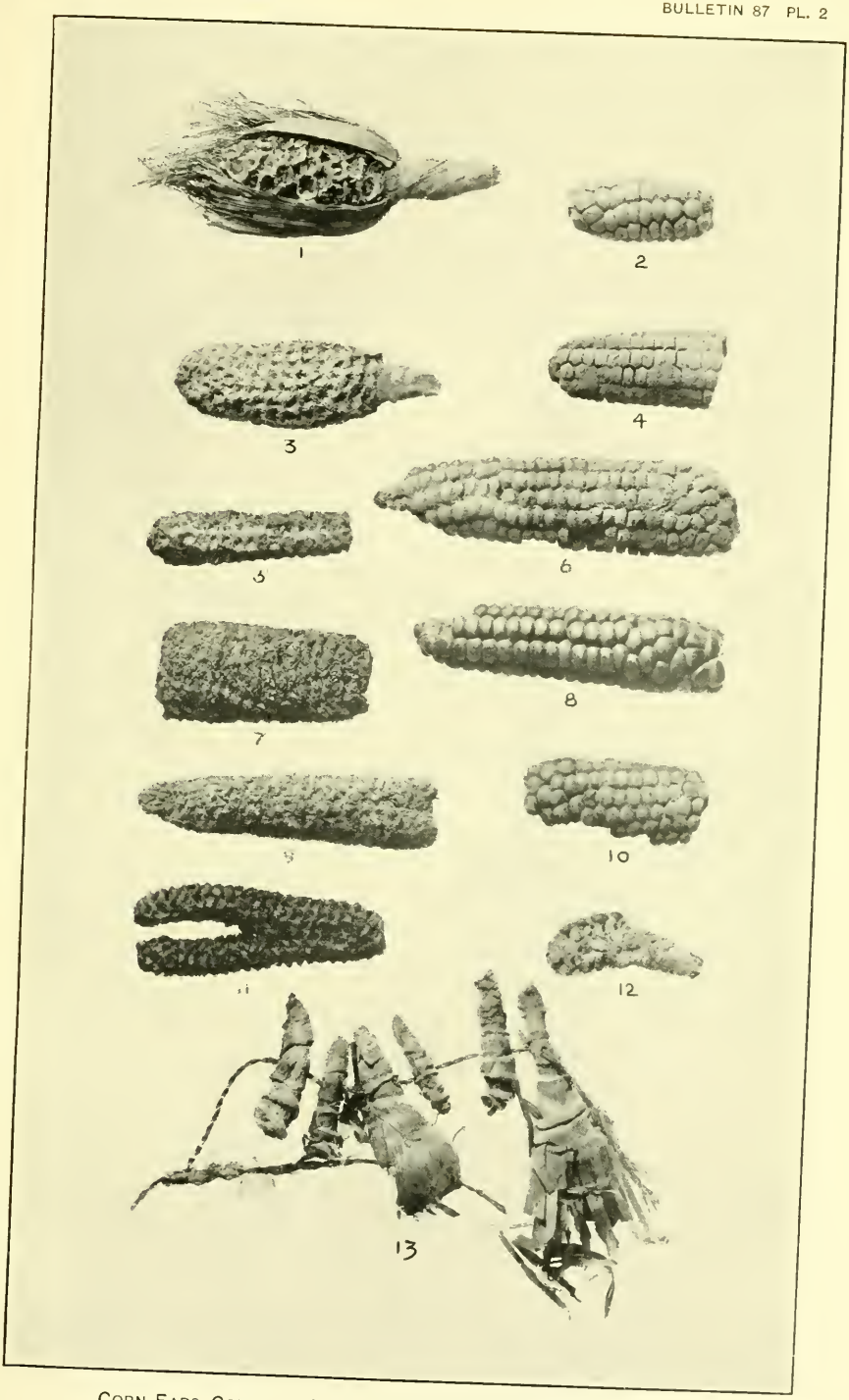
Ears and scattered grains of corn were found in some quantity in the Tularosa Cave, where it had evidently been placed with burials. The ears are 3 of 8, 2 of 12, and one of 16 rows. One cob is of 18 rows. The grains are smooth and short, of yellow, blue, and carmine, but much faded by aging. The cob is generally slender, sometimes bifed or showing a tendency to pairing, and the typical ear is 5 inches long, while there seems to be a preponderance of stout nubbins. (Pl. 2, figs. 1–12, $4\frac{3}{4}$ to $5\frac{3}{4}$ inches long.) From Spur Ranch, near Luna, New Mexico, come 6 cobs of 8, and 2 of 10 rows. The cobs are $3\frac{1}{2}$ to

5¼ inches long, and slender, being 1½ to ⅞ inches in diameter. In the upper Blue River caves the cobs are of 12 rows. No grains were found. In the Johnson caves, middle Blue River, the cobs are of 10 rows and from 3 to 7½ inches long, in the upper cave, and in the lower cave, which had never been entered by white people previous to this exploration, the 12 cobs obtained there are 5 of 10, 6 of 12, and 1 of 16 rows, measuring 4¾ to 6¼ inches in length and ¾ to 1⅛ inches diameter. From a cave near Silver City, New Mexico (Cat. No. 58180, U.S.N.M., collector H. H. Rusby), the specimen is of 10 rows, the cob slender and 4 inches long. From Beaver Creek, near Camp Verde, Arizona, corncobs (Cat. No. 88403, U.S.N.M., collected by A. R. Marvine) are of 8 and 10 rows.

The corn of the ancient Tarahumares secured by James Mooney from a cave near Aguas Calientes, southwestern Chihuahua, (Cat. No. 209381, U.S.N.M.), is of 8 and 10 rows, with red and mottled orange or yellow rugose grains deeply set in the septæ of the cob. The ears are 4 to 5 inches long and the cob ¾ inch in diameter.

From Wukoki (Black Falls) ruin on the Little Colorado River, Arizona, Dr. J. Walter Fewkes collected 6 corncobs, 3 each of 8 and 10 rows. (Cat. No. 270391, U.S.N.M.) One ear of 8-rowed corn in a charred state was removed from Kawaiokuh ruin, Jettyto Valley, northeastern Arizona, by the writer. Seven cobs from the cliff ruins of Canyon Del Muerto, northeastern Arizona, from the collection of the Museum of the Brooklyn Institute (Cat. No. 250292, U.S.N.M.), show 2 of 10, 4 of 12, and 1 of 14 rows. They are 4½ to 6½ inches long and uniformly ⅞ inch in diameter. Eight ears from this collection show 1 of 8, 2 of 10, 4 of 12, and 1 of 16 rows. The colors are faded red, yellow, and black. Some of the ears have small translucent grains, and some of the grains of the mature corn are dented. From Cliff Palace, Mesa Verde, southern Colorado, Dr. J. Walter Fewkes collected 10 cobs, 3 of which are 12 and 7 of 10 rows. The ears are 3½ to 5 inches long and ⅞ to 1 inch diameter. (Cat. No. 257467, U.S.N.M.) From Spruce-tree House, Mesa Verde, the cobs, numbering 10, show great variety, being 2 of 10, 5 of 12, and 1 each of 8, 14, and 16 rows. The cobs measure 4 to 5½ inches long and ⅞ to 1 inch in diameter. One well-preserved ear comes from Wickiup Canyon, San Juan County, Utah, collected by A. C. Jessup. (Cat. No. 237845, U.S.N.M.) It is 8-rowed, with small, smooth, yellow, flinty grains. The ear is 4 inches long and 1¾ inches in diameter. The Mesa Verde corn is 8, 10, and 12 rowed. (Cat. No. 255196, U.S.N.M., W. L. Shear collector; three specimens.)

Four specimens of cobs from a cavate lodge near Santa Clara, New Mexico (Cat. No. 234781, U.S.N.M., collected by Mrs. M. C. Stevenson), are 12, 14, and 16 rowed, 5 inches long and 1 inch in diameter. One cob has been dressed down for use and another has a feather and




CORN EARS, COBS AND STEMS OF EARS THAT HAVE BEEN STRUNG.

FOR EXPLANATION OF PLATE SEE PAGES 7 AND 9.

a wooden point stuck in the pith to make a dart. An ear stalk in this lot is quite large and has seven joints. The Hopi corn, which preserves best the ancient Pueblo type, is generally of 12 rows, the smaller grains, "pop corn," are of 14 and 16 rows.

An interesting object consisting of a row of ears of new corn strong on yucca fiber cord comes from the Tularosa Cave. (Pl. 2, fig. 13.) The Pueblos were accustomed to prepare new corn in this manner for hanging from the rafters of the house for winter use. Another similarity is the corncob smoothed by wear among the Pueblos for dressing cord, and perhaps used by the ancients for the same purpose. Game darts of corncob with a feather thrust into one end like those now seen among the Pueblos appear to have been made by the ancient peoples of this region. The husk is found attached to pahos, or prayer sticks, overlaid on cord, shredded for some purpose, and in one case made into a sandal. Sections or joints of cornstalk, showing a comparatively slender plant, are found in the caves, and from the Tularosa Cave comes a joint with the base of the ear and husk attached. A tassel was also recovered from the débris. Corn husk tied in bundles is common in nearly all the sites explored, and a number of neatly folded bundles of dried green leaves were encountered during the work.

### COTTON.

Seeds of cotton were apparently not present in the sites investigated, but there was abundance of cord and cloth, indicating that cotton was employed to some extent. Tularosa Cave, where the fullest series of objects illustrating the life of the former inhabitants of the region were found, is at too great an elevation for the raising of cotton, but the lower Blue and Gila have a suitable climate, and, without doubt, cotton was anciently raised there, as it has been up to quite recent times by the Pima on the lower Gila. The cotton used by the tribes inhabiting the colder portions of the area was brought to them by aboriginal commerce.

### GOURDS AND SQUASHES.

Gourds of several varieties were employed for various economic and ceremonial purposes, but the fruits were small, so far as can be deduced from the remains of the shells. These are a necked species, smooth and having a rather thick rind, which assumes a beautiful dark-brown color and high polish from age and handling; a rugose species with thin yellow rind, showing green irregular bands and drying irregularly; a species with very thin smooth yellow rind without markings, the rind sometimes cut into rows of points evidently as ornaments or ceremonial decoration; and the small wild gourd, the rind of which is very fragile and much marked. The wild gourd is

commonly found in cave rubbish, but on account of its extreme bitterness it may not have been eaten, and the shell is too thin for practical uses, but the dried chaffy fibrous pulp may have been valued for some purposes. Necked gourds were used as seed vessels (fig. 5, diameter, 4½ inches; height, 7 inches; Cat. No. 246294, U.S.N.M.) and dippers. No evidence could be procured that gourd rattles were made. Some of the fragments from the Tularosa Cave show ornamentation by scratching on the outer surface of the gourd. Gourd shell was also made into ornaments (see figs. 219 and 220), probably representing flowers, as among the Hopi and other Pueblos, and perforated or otherwise worked fragments are found in some number in the cave débris. One potter's tool of gourd in the form of a spoon-like spatula and resembling those used at present by the Pueblos, was taken from the Tularosa Cave. Squash stems are common in the caves, and occasionally pieces of the rind are seen. The stems are large and bulbous, indicating a bulky fruit.

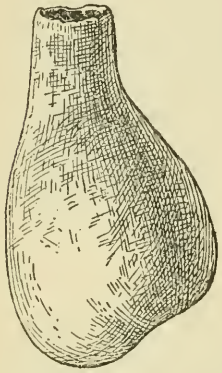


FIG. 5.—GOURD SEED VESSEL FROM TULAROSA CAVE.

Seeds of the squash and of other plants of this genus are sometimes preserved in the cave deposits.

BEANS.

Beans of apparently three varieties were among the valuable food resources of the tribes of the upper Gila-Salt drainage. One of these is a dark purple, medium size, oblong bean of the typical kidney shape; another a small oblong, dark, purple-brown bean; and the third a small, rather full, yellow bean. Specimens are very scarce in the caves, though the dried husks are frequently observed.

FRUITS.

The banana-like fruits of the datil (*Yucca baccata*), and tunas from cacti of several species, were consumed as food, as no doubt were the wild gooseberry and other fruits in season along the mountains. It is known, also, from specimens found, that the roasted leaves of the agave, which furnish an agreeable sweetmeat, were eaten by these Indians.

The wild grape grows abundantly along the streams and at the time of blooming fills the valleys with a delicious odor. The fruit is sour but edible.

ROOTS.

There were found a number of roots which had been gathered and dried by the aborigines, but of these only the rough masses of soap-root (*Yucca* sp.) and of the wild gourd can be identified.

NUTS.

Small acorns, such as are now eaten by the Mexicans, walnuts, and pinyon and juniper nuts were recovered from the caves. The small oaks furnishing the acorns grow on the high land above the streams, and with cedar and juniper berries form the principal food supply of bears. Walnuts grow in profusion along the streams, the trees being quite different in habit from those in the East, forming clumps of stems clothed in dense foliage and yielding great quantities of nuts.

PARTS OF WILD PLANTS.

Spines of the agave; leaves of the yucca and dasylirion; the curious woody seed cases of the *Oenethera;* the devil's claw( *Martynia* sp.); grass of several species; *Artemisia* sp.; thistle, *Carduus neo-mexicanus; Amaranthus palmeri;* stems of two species of rush; arrow reed; pine cones; bark of cedar and oak; galls of the oak; pithy stems of *Ambrosia*, the white pith of which was used on offerings; flowering stems of the yucca and like plants; twigs and branches of various shrubs; openwork stems of the *Cactus opuntia spinosior* Toumey; fungi, lichen, and galls were found, principally in the débris of Tularosa Cave.

FIG. 6.—BRUSH OF YUCCA FROM TULAROSA CAVE.

Branches of oak, the twigs coiled up at the ends, forming a close bunch of leaves, were numerous in the Tularosa Cave. The use of these leaf bunches can not be determined, but they were perhaps gathered for bedding.

Strips of yucca leaf pounded or chewed at one end to release the fiber were employed as brushes (fig. 6), like those used by the present Pueblos for decorating pottery, and brushes for cleaning the teeth and for other purposes were made by chewing the ends of soft sticks. (Cat. No. 246018, U.S.N.M.; length, $4\frac{3}{4}$ inches; Tularosa Cave.)

## STONE, BONE, SHELL, AND METAL.

### MATERIALS AND GENERAL REMARKS.

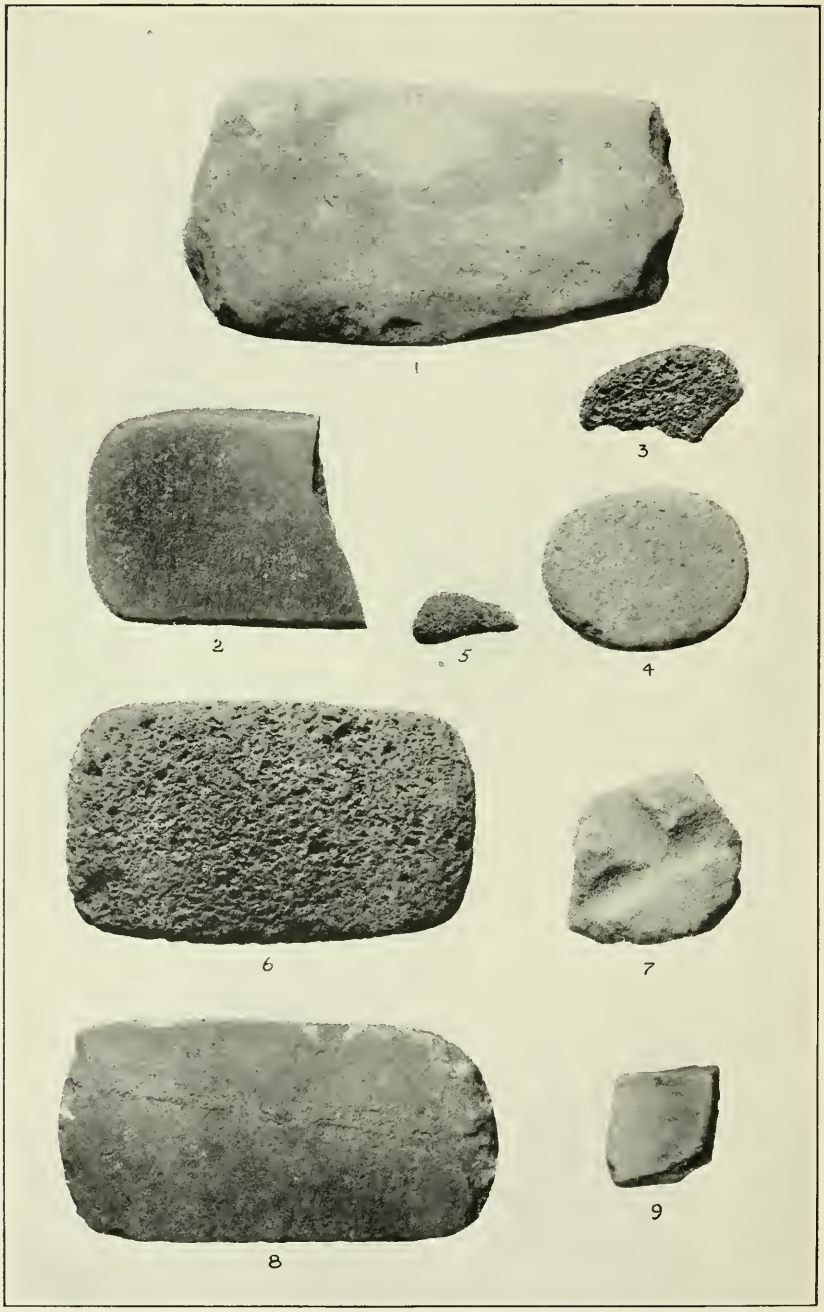
In the Pueblo region there are few materials found in place suitable for the making of stone implements, and the natives had to depend principally on detrital quarries. Especially is this true of stone suitable for flaking and chipping, and hence the region lacks in the quantity, boldness, and fineness of chipped artifacts found in other regions. Chalcedony and wood opals are in place, but are almost valueless on account of containing flaws; some chalcedony, however, could be worked into small arrowheads and knives, and this material was often ground into cylinders and highly polished. Obsidian was

found in the form of small water-worn masses in gravels of the larger streams and was the principal material employed for arrowheads. Occasionally red and yellow jasper and very rarely a specimen of the highly prized green jasper were encountered. Hematite had also a limited use. A red claystone, resembling catlinite, a brownish to grayish slate, a very fine dark blue soapstone, turquoise, variscite, and occasionally fluorite were used for beads, but the commonest material is a white calcite which occurs in layers of convenient thickness, and the beads made from this material resemble closely those made from shell. Turquoise also occurs in laminæ, thus facilitating greatly the manufacture of beads from this comparatively hard stone. The rocks of greatest economic importance to peoples in the Pueblo stage of culture are those of tough resistant structure and those of crystalline structure. The former are abundant in the volcanic or eruptive rocks of the region, hence weapons, hammers, etc., could be made of good stone when found. But the latter are scarce and abrasives would have to be supplied by stone of vesicular character.

The art of working stone among the inhabitants of the upper Tularosa was limited in extent and the artifacts crude, but a few miles away, in the valley of the lower river, aboriginal objects are superior, equalling the best in the Pueblo region. Such contrasts are common among the remains of the ancient Pueblos, and depend, perhaps, on the number of people inhabiting a pueblo, their situation, well being, and resources. All these things, when favorable, aid in stimulating arts. It is invariably found that the artifacts of a large and populous pueblo are superior to those of a small settlement, even when the latter is in the same valley and within a few miles of the former. It appears also that Pueblo industries were specialized in ancient times; that is, were clan industries which later became village industries, a social feature observed all over the world, a good example of which may be seen in the basket industry of the Hopi towns, where wicker baskets are confined to Oraibi and coiled baskets to most of the Middle Mesa villages.

Nevertheless, where these conditions are satisfied and the material for making stone implements is abundant and accessible, it is sometimes found that the art of working stone remains in a very backward state, and sometimes, on the contrary, when good materials are lacking and must be brought long distances, the art shows peculiar excellence. Of this the culture remains of the ancient prairies and plains tribes give numerous instances.

It is not safe, also, to base conclusions as to the artistic rank of a group of people on the rude or primitive character of workmanship or design in any one material. We may find that axes, hammers, metates, rubbing stones, mortars, etc., suggest the work of novices, of people in a low degree of culture, or of those who are satisfied with




STONE IMPLEMENTS FOR GRINDING AND ABRADING.

FOR EXPLANATION OF PLATE SEE PAGE 13.

the least effort to produce a given result, and discover to our surprise that the work in fine stone, shell, and bone of the same people evidences a high degree of skill and taste.

It might be well to inquire whether artistic works in the more enduring materials were not the outcome of tribal well-being as regards the food supply and the resulting leisure to perform these works. Unquestionably there are seasonal occupations pursued when the land and rivers are yielding sustenance and the temperature has reached its zonal limit, which must affect man as it affects plants and animals, and at this favorable time, to take the Pueblos as examples. we find pottery making, weaving, wood carving, and such arts going on, or the artistic feeling may be expressed through the drama of ceremonies. Enforced leisure also is a powerful stimulus; for example, the western Eskimo utilize their long night not only in the practical work of repairing and making additions to the hunting equipment for the next season, but in carving and decorating ivory, wood, or horn objects which may be of economic value or merely expressive of a sentiment for art. It may be conceded on the whole that the comparative degree of advancement or efflorescence of art is due largely to the material well-being of social units.

### DOMESTIC UTENSILS OF STONE.

The most common domestic utensils of stone are metates and manos. The type universal through the Pueblo region is common here. The metate is made commonly of coarse volcanic rock, and there is apparently not the same discrimination as to the grades of fineness of stone as is observed in the northern portion of the Pueblo region. Metates with feet, after the Mexican type, do not belong to this region, the few specimens found in the Gila Valley probably being recent introductions from the country to the south.

The mano, which is always made nearly as wide as the metate, has a tendency to take the same shape on wearing as those of the present or ancient Hopi, for instance. Ordinarily, however, the mano was a thick oblong stone with the corners rounded off and with grooved sides. (Pl. 3, figs. 2, 6, 8.) It was apparently ground perfectly flat upon the metate and not raised during the stroke, a habit among the present Pueblos which reduces the mano to a form wedgelike in section, and thus often the worn-out specimen is a thin flat tablet.

The metate has a tendency to become channeled, the wear of the hand-stone leaving raised sides, but these sides never have the height of those observed in the metates from Chaves Pass which project above the grinding surface nearly a foot, showing that very large blocks of rock formed the original implement. The metate was mounted in a sloping position upon a foundation of stones embedded

in mud. One specimen, of oval shape, was found in place at Blue. It was observed, also, that a depression was formed in the base under the lip of the metate for placing the bowl to receive the meal. (Fig. 7.) At Blue, Arizona, where extensive examination was made of the débris surrounding the pueblo, many hand stones of irregular size and wear were observed. (Pl. 3, fig. 1.) Most of these, it is probable, represent stones which were picked up and adapted to use for grinding, and not pecked into shape, although some of these stones may have been those used by the potter in reducing the lumps of clay and other materials used in pottery, as among the Walpi potters, where a number of flat and other stones were applied to various purposes without having received specific form.

Still another class of hand stones of very regular shape, a little longer than broad (pl. 3, fig. 4), was occasionally met with at Blue and somewhat frequently in the lower valley of Blue River. (See fig. 20.) These resemble a type of stone implements from southern California. They are usually of very hard material and do not altogether seem to have been used for rubbing on a flat surface. As a rule these stones are better finished than any other of the domestic stone utensils. It is probable that they had some use in pounding deerskins or other soft materials. A few hand stones were also found at Blue having a ridge along the back resembling somewhat the rubbing stones from the Gila Valley and from Mexico. Small grit stones of more or less irregular form, but worn on several faces, were seen. (Pl. 3, fig. 9.) These appear to have been used on surfaces where abrasion was required. They have commonly been called whetstones, but their use appears to have been on flat areas. Lava was also used where a strong abrading agent was required. The lava artifacts are commonly of irregular form. (Pl. 3, figs. 3 and 5.)

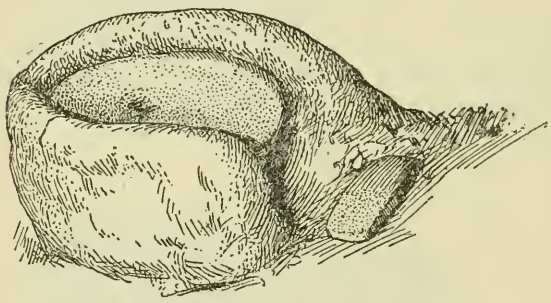


FIG. 7.—METATE SET ON A FOUNDATION FROM BLUE.

Grinding, rubbing, polishing, smoothing, and other abrading stones for use in the hands are relatively common, and in very many cases they are merely stones of suitable size showing such use and lacking the work necessary to make them definite implements such as can be classified in terms of art form. Most of these makeshift implements were found in the Martin ruin at Blue. (Fig. 8.) Ground depressions on rocks in place are not often observed in this region, but a fine

example of a series of such depressions was seen on a large block of stone near Tularosa Cave.

Worked stones connected with household uses or architecture were observed at the Delgar ruin, on the lower Tularosa. They consist

FIG. 8.—GRINDING STONES FROM BLUE.

of several subconical blocks like the seats described by Dr. J. Walter Fewkes from Four Mile Ruin;[1] a conical stone about 15 inches high; and a number of large stone disks chipped on the edge. Objects of this character were not found in any other ruins.

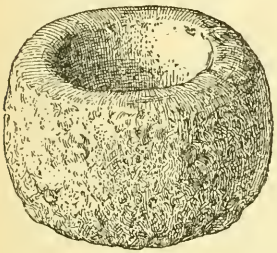


FIG. 9.—STONE MORTAR FROM SPUR RANCH.

### MORTARS AND PESTLES.

No large well-finished pestles are found in this region, and on the whole this implement was merely a thing of utility receiving scant treatment in the way of working out and finishing. Most of the pestles were made from stones which approached the shape desired and necessitated little labor to reduce them to the size required.

Mortars are small and rarely has much care been given by the stoneworker to secure accuracy of form or smoothness of finish. A more specific description of a mortar and pestle from the Spur Ranch, Luna, New Mexico, follows:

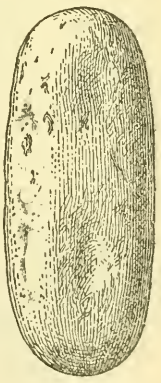


FIG. 10.—PESTLE FROM SPUR RANCH.

Bowl-shaped mortar of breccia, irregularly worked on the exterior. (Fig. 9.) The working cavity is very regular, is 5¼ inches in diameter and 3¾ inches deep. An oblong cylindroid of fine grain, almost white stone, found in the same room with the mortar, but not in close association with it, is perhaps the pestle. It is 5¾ inches long and 2 by 2⅜ inches in diameter, the end smooth and rounded, and the sides showing marks of the pecking required to bring it into shape. It has two shallow pits in the surface, probably to facilitate gripping by the hand. (Fig. 10, Cat. No. 231886, U.S.N.M.) Such mortars were probably used for pounding

[1] Two Summers' Work in Pueblo Ruins, 22d Ann. Rep. Bur. Amer. Ethnology, 1900–1901 (1904), plate 65.

yucca and other leaves for fiber, crushing leaves and roots for infusions, and for comminuting such materials not suitable for reduction on the grinding slab. The Pueblo mortar is never large and was not used for the preparation of food, but was employed for a number of small tasks as occasion required. Generally they were not portable, being formed in neighboring rock masses wherever the conditions were favorable.

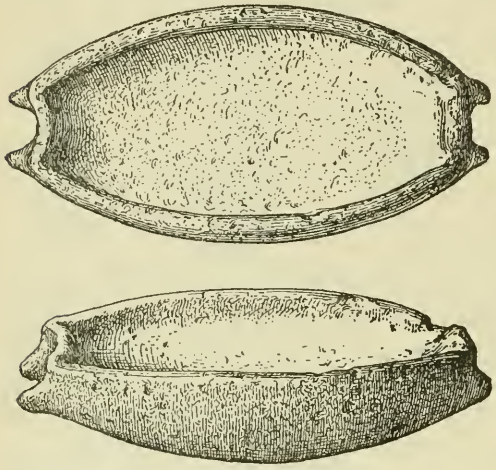


FIG. 11.—CARVED STONE VESSEL FROM SOLOMONSVILLE.

STONE VESSELS.

In the Upper Gila Valley (Pueblo Viejo Valley) there are encountered somewhat frequently stone vessels of superior workmanship, the material being very hard, the form very characteristic, and the finish excellent. They are oblong, terminating in projections at both ends (fig. 11). This vessel was also probably a form of mortar for small quantities of material. (Cat. No. 238437, U.S.N.M.)

Another small stone mortar (fig. 12) is of gray tufaceous rock and has a small projection on one side, forming the handle. The specimen was found in a grave containing worked shell objects. (See fig. 12, Cat. No. 231823, U.S.N.M.; diameter, $1\frac{3}{4}$ inches; height, $1\frac{1}{4}$ inches; Spur Ranch, Luna, New Mexico; and fig. 13.)

FIG. 12.—SMALL STONE VESSEL FROM SPUR RANCH.

A stone cup, neatly worked from gray tufaceous rock, and having side walls and flat bottom, is shown in figure 13. (Cat. No. 231965, U.S.N.M.; diameter, $2\frac{1}{4}$ inches; height, $1\frac{1}{4}$ inches; Spur Ranch, Luna, New Mexico.) In many cases natural stones, mostly concretionary, with cavities of a shape suggesting use as vessels, have been found in the ruins.

FIG. 13.—SMALL STONE VESSEL FROM SPUR RANCH.

Figure 14 illustrates a stone vessel made from very hard, fine-grained, gray limestone, smoothly finished. The working surface is evenly curved and polished. It is possible that this vessel was used for grinding paint, but the surface shows no such wear. Stone vessels of

this character are quite rare in this region, except on the upper Gila, where they take the forms shown in figure 11. (Cat. No. 98695, U.S.N.M.; diameter, 5¼ inches; height, 1⅞ inches.)

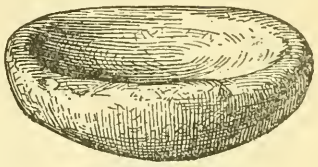


FIG. 14.—STONE VESSEL FROM UPPER SAN FRANCISCO RIVER.

SMOOTHING STONES.

Important implements of every Pueblo household, ancient and modern, were polishing stones, which had their most extensive use for work in clay, whether in producing a fine surface on pottery or in polishing the mud floor. The polishing stone is essentially a woman's tool, since work in clay has always been her specialty.

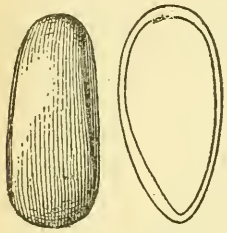


FIG. 15.—POLISHING STONE FROM APACHE CREEK.

One of these (fig. 15) is of an extremely fine-grained yellow stone, beautifully worked into the form desired by the potter and highly polished. This was, no doubt, a prized object, and was found in a grave containing human remains. (Cat. No. 245942, U.S.N.M.; width, 1 inch; length, 1¾ inches; thickness, 15/16 inch; N. H. Ranch, Apache Creek, Socorro County, New Mexico.)

A smoothing stone from the Spur Ranch, Luna, New Mexico, is formed of hard, fine-grained stone resembling limestone (fig. 16). On one side is a flat, highly polished area which indicates its use on some soft material, though probably not for pottery finishing. (Cat. No. 231963, U.S.N.M.; diameter, 3 inches; thickness, 1¼ inches.)

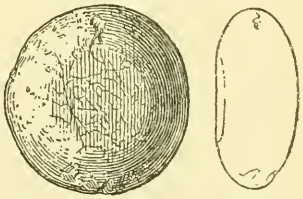


FIG. 16.—SMOOTHING STONE FROM SPUR RANCH.

In the Tularosa Cave, New Mexico, was found a block of very coarse sandstone (fig. 17), on one face of which is a groove for the purpose of rasping wooden rods. In the process the stone has become more deeply grooved. (Cat. No. 246471, U.S.N.M.; dimensions, 4¼ by 2 inches.)

Another specimen has two grooves crossing at right angles. (Pl. 3, fig. 7.)

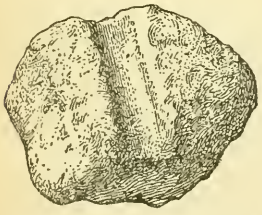


FIG. 17.—STONE RASP FROM TULAROSA CAVE.

Grooved smoothing stones for arrows and rods are not plentiful in the region. They are also simple in form compared with those of the Pueblo Viejo Valley on the upper Gila. The material is very fine-grained stone, usually limestone. The groove is polished and is probably designed more for smoothing wood than for abrading it. Some of these stones show evidences of heat and some are cracked by having been subjected to fire. One of

these simple stones is shown in figure 18, Cat. No. 231859, U.S.N.M.; Spur Ranch, Luna, New Mexico.)

POTTERY-WORKING STONES.

Circular or oblong flattish stones of convenient size for grasping in the palm and fingers of the hand are used by the Pima-Papago-Maricopa group, the Mohave, Yumas, Dieguenos, Kawia, and other southern California pottery-making tribes. These stones are either selected bowlders, stones picked up from ancient sites, or stones probably worked to form by the present tribes. In all cases the stone having the proper contour would be selected for the purpose, and as many neatly dressed stones of the type of the small grinding stone, which is circular or of pillow shape, are to be secured from the immediate neighborhood of ruins in this region, they have been taken to the camps of the Indians and employed in pottery making. Russell says that the Pima "use a flat circular stone about 4 inches in diameter."[1] The implements required by the Indian potters of the Southwestern border are paddles of wood or stone, and an anvil stone, or bumper, which is held within the vessel in process of coiling, and between the stone and the paddle the coils are pressed down, the clay is thinned or regulated in thickness, while at equal rate the vessel is expanded and reduced to the form desired. By this means, in the hands of an expert potter, vessels of remarkable thinness can be produced.

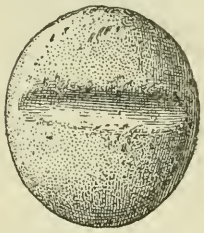


FIG. 18.—ARROW-SMOOTHING STONE FROM SPUR RANCH.

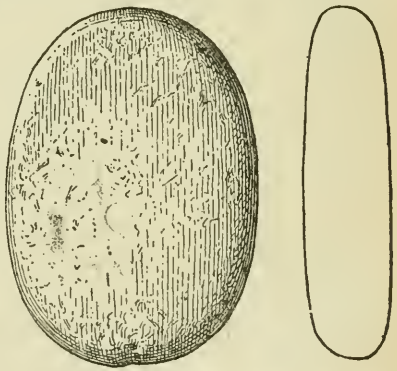


FIG. 19.—SMOOTHING STONE FROM SPUR RANCH.

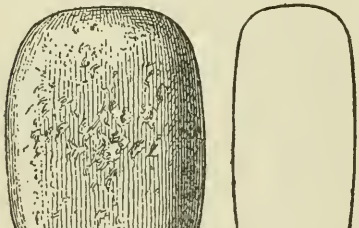


FIG. 20.—SMOOTHING STONE FROM LOWER SAN FRANCISCO RIVER.

A smoothing stone which may possibly be a pottery-working tool is oval in shape and finally worked from very hard grit stone. (Fig. 19; Cat. No. 231881, U.S.N.M.; length, $5\frac{1}{4}$ inches; width, 4 inches; thickness, $1\frac{5}{16}$ inches; Spur Ranch, Luna, New Mexico.) A finely finished specimen of purple quartzite was found at the Stockton Ranch on San Francisco River near the mouth of the Blue. The edges of the implement are pecked to give a roughened surface to

[1] 26th Ann. Rept. Bur. Amer. Ethnology, p. 126.

aid the hand grasp. (Fig. 20; Cat. No. 246509, U.S.N.M; length, 4½ inches; width, 3¼ inches; thickness, 2 inches.)

ARROWHEADS, THROWSTICKS, AND DARTS.

The arrowheads of this region are almost exclusively of obsidian which varies from an opaque black to translucent, almost as clear as rock crystal. They are small, usually nocked, and sometimes serrated. Such heads as have been found still remaining on the arrows are small, and this appears to be characteristic of those arrows intended for war or for hunting. (See fig. 142.) Some rather long, slender arrowpoints appear to have been fashioned for use as offerings. As a rule the arrowheads do not show great skill in their manufacture, but occasionally an exquisitely chipped one is encountered.

The points for the throwstick darts appear to be extremely scarce, so far as can be determined, and there is a likelihood that they never were very plentiful. (See fig. 21.)

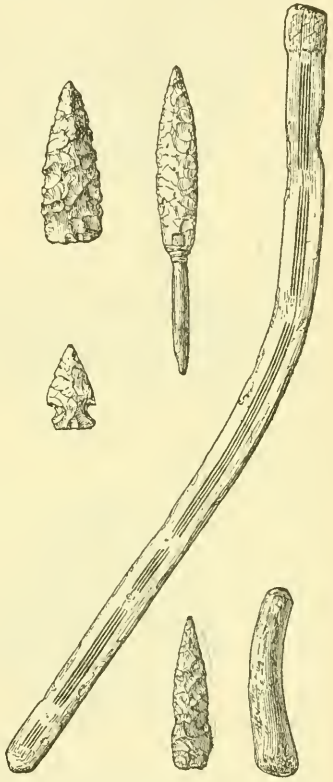


FIG. 21.—THROWSTICK, DARTS, KNIVES, AND PUNCH FROM NEAR LAVA, NEW MEXICO.

No throwsticks were found by the Museum-Gates Expedition, nor is it known that any have been found in this region. The only evidence that such an implement was used is a few foreshafts of darts of the kind hurled by means of the throwstick. (See fig. 21.) The shapes of some of the worked rods appear to suggest the throwstick (see pl. 20, fig. 2), but it is not possible to reach a definite conclusion on the subject. Also the articulating ends of bones (see fig. 136) may be bunt heads of throwdarts.

Mr. John R. De Mier, of Las Cruces, New Mexico, found in guano caves 9 miles east of Lava, New Mexico (on the Albuquerque-El Paso branch of the Santa Fe route), a number of interesting objects which he forwarded to the National Museum. The collection contains a throwing stick (fig. 21) consisting of a slat of oak, 25½ inches long and 1½ inches wide, warped strongly and grooved on both sides at intervals along the middle line, the ends of the stick

being roughened as for wrapping; a throw-dart head, consisting of a blade of elegant outline of white opaque chert, 3¾ inches long and ⅞ inch wide, mounted with sinew in a wooden foreshaft 3⅜ inches long (fig. 21); two knives or throw-dart heads of yellow jasper and dark-brown chert, 3¼ and 3 inches long (fig. 21); an arrowhead of white chert 1¾ inches long; and an antler stone working tool 4 inches long, dark-brown from age and highly polished from use (fig. 21).

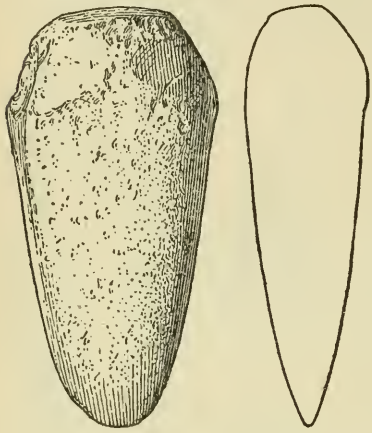


FIG. 22.—STONE AX FROM SPUR RANCH.

AXES, HAMMERS, AND MAULS.

It is not usual to find a well finished specimen of the ax, and it is evident that the only care on the part of the workers was to make an effective tool. It is also curious that so few axes are found, and this is all the more remarkable in areas that have evidently been inhabited for a long time by apparently a large population. The type has invariably a single groove, usually running clear around the specimen. The material is almost always a bluish volcanic rock or basalt which is well suited for the purpose.

An unusual form of greenish stone implement worked to wedge-shape suggests an ungrooved ax. (Fig. 22 and section.) The poll of the specimen has not been carefully worked. It may be an unfinished ax, or may have been made for some special purpose. (Cat. No. 231858, U.S.N.M.; length, 6¼ inches; width, 3 inches; thickness, 1¾ inches; Spur Ranch, Luna, New Mexico.)

A hammer-maul consisting of a bowlder of gray stone, having grooves cut on the opposite sides, is shown (fig. 23), with outline. Originally this implement was probably hafted and used as a maul. (Cat. No. 231833, U.S.N.M.; diameter, 4¼ inches; thickness, 3¼ inches; Spur Ranch, Luna, New Mexico.)

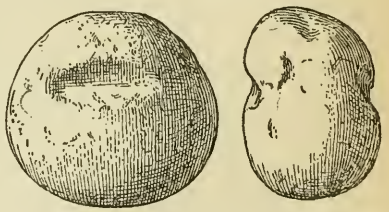
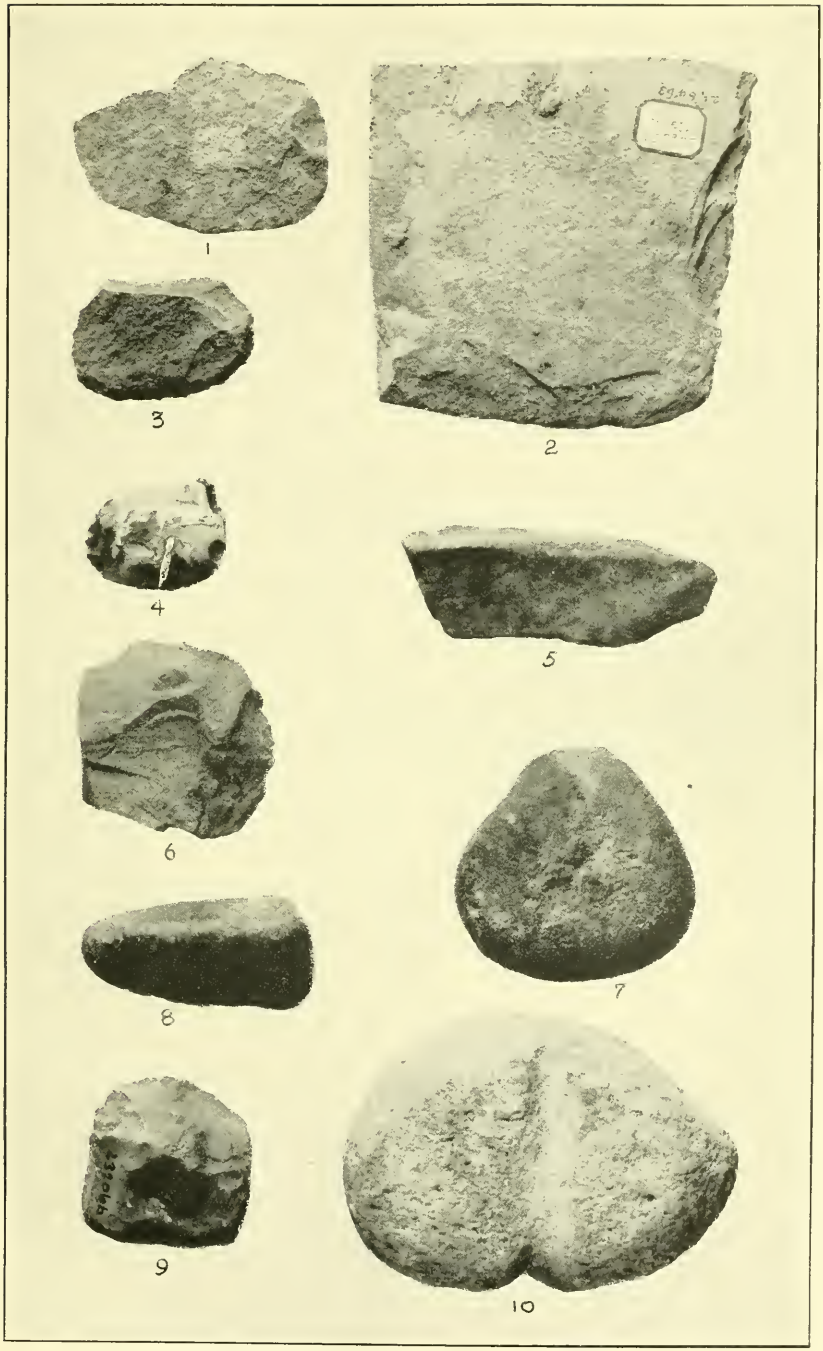


FIG. 23.—STONE GROOVED MAUL FROM SPUR RANCH.

Another specimen from the same locality (pl. 4, fig. 10) is grooved deeply almost around the circumference. (Cat. No. 231960, U.S. N.M.; diameter, 3¼ inches; length, 6 inches.)

A block of bluish chalcedony much chipped (pl. 4, fig. 9) resembles the hammers from the Petrified Forest region, northern Arizona. The specimen shows little use as a hammer. (Cat. No. 232066, U.S.




STONE IMPLEMENTS FOR CUTTING AND POUNDING.

FOR EXPLANATION OF PLATE SEE PAGES 20 AND 22.

N.M.; diameter, 2¾ inches; Spur Ranch, Luna, New Mexico.) A block of hard black basalt chipped on two-thirds of its circumference (pl. 4, fig. 6) is also probably a hammer or striking tool. (Cat. No. 246462, U.S.N.M.; Tularosa Cave, New Mexico.) An unmodified stone hammer of hard brown stone (pl. 4, fig. 8) is from a small cliff-house ruin near Spur Ranch. (Cat. No. 232065, U.S.N.M.; length, 3½ inches.) A pitted hammer of triangular shape (pl. 4, fig. 7) is made of coarse basalt. One side is smooth as though the specimen had at times been used as a rubbing implement. (Diameter, 3½ inches; thickness, 1½ inches; Tularosa Cave, New Mexico.)

24. 25. 26.

FIGS. 24–26.—STONE BALLS FROM SPUR RANCH.

CLUBHEADS, BALLS.

Balls of hard stone of reasonably accurate spherical shape are encountered in the ruins, but never as mortuary objects with the dead. It is possible that they are hammerstones worked down from long use, but apparently they were reduced by the ordinary processes of stone working for a definite purpose and, it appears probable, were originally inclosed in rawhide for the slung shot or flexible head club, such as is used by the Apaches. No specimens so mounted, however, have been found in archeological sites, such as caves or shelters, where they would likely be preserved. Another suggestion is that these balls are used in games, and probably the smaller specimens had this employment, as this form has survived among the Pueblos and the Pimas, Cocopas, Mohaves, and other southern Arizona and California tribes.

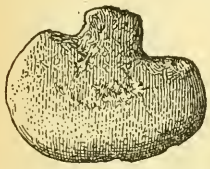


FIG. 27.—STONE HAMMER FROM SPUR RANCH.

Some of the stone balls are from Spur Ranch, Luna, New Mexico. (Figs. 24, 25, 26.) These are smoothly made from hard stone and were probably used in games, or, with less probability, as clubheads. (Cat. No. 231958, U.S.N.M.; diameter, 1¼, 1½, and 1¾ inches.)

What appears to be a clubhead is made of soft stone, is oblong and rounded, and on one side a projection has been formed, evidently for the purpose of hafting. (Fig. 27.) The rounded surface shows pittings, as though the implement were used for hammering. The character of the material, however, does not indicate its use as a hammer. (Cat. No. 231940, U.S.N.M.; length, 3 inches; width, 2½; Spur Ranch, Luna, New Mexico.)

KNIFE.

The knife of chipped flint or other material is not very common in this region, and it appears probable that its place was taken by the sharp-edged spalls, more or less worked, which are found in abundance near the ruins. (See fig. 138.) Occasionally the chipped

blades are hafted, perhaps for the foreshafts of the short dart hurled with the throwing stick. Large chipped blades are almost never found in this region, though they occur in the Little Colorado Valley and are at the present time used by the Zuñi as cult objects.

### SCRAPERS.

Flakes of chert and quartzite which appear to be simple scraping tools were found occasionally in the ruins, and in some number in Tularosa Cave, where they are associated with pieces of branches which had been cut by repeated scraping. (See Wood.) There are also oval spalls, nearly uniform in shape and size, occurring in all sites and in such numbers as to be regarded as an accredited implement. Usually they show wear, and in some cases have been ground to an edge. There is proof that this implement was used for wood working. (See p. 61.) It also was a convenient tool for other purposes, such as fleshing, bark peeling, graining leather, etc. The scraper blade of oval cuboid shape is not found in archeological sites here or in any other part of the Pueblo region. Flakes of obsidian appear to have been used in dressing bows, arrow foreshafts, etc., as glass is used by the cabinetmaker.

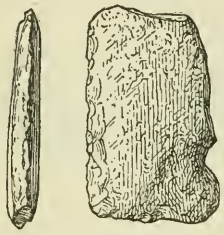


FIG. 28.—STONE SCRAPER FROM TULAROSA CAVE.

In this region of altered, igneous, and eruptive rocks there are innumerable spalls of all shapes and sizes at hand for selection. That they were so selected is seen from the spalls found in Tularosa Cave. Plate 4, figure 1, shows a spall of gray basalt having an excellent cutting edge; figure 3, a spall of black basalt, the edge of which has been improved by chipping; figure 4, a plate of red chert chipped carefully; figure 5, a much-used spall worn on the edge; and figure 2, a square plate of basalt chipped on two sides ($5\frac{3}{4}$ inches square).

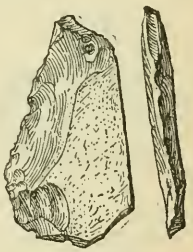


FIG. 29.—STONE SCRAPER FROM SPUR RANCH.

A more finished scraper, or cutting implement consists of a spall of blue-gray basalt, the edge of which is chipped (fig. 28). (Cat. No. 246462, U.S.N.M.; length, $2\frac{1}{4}$ inches; width, $1\frac{5}{8}$ inches; Tularosa Cave, New Mexico.

Another example of hard purple rock, chipped on a portion of the edge (fig. 29) comes from the Spur Ranch, Luna, New Mexico. (Cat. No. 231815, U.S.N.M.; length, $2\frac{1}{4}$ inches; width, $1\frac{3}{8}$ inches.)

### SAWS.

A great number of saws which consist of flaked or thin plates of volcanic rock, worked straight along one edge, which may be toothed

or merely sharp, are found south of the White Mountains, but such objects are very infrequent in the rest of the Pueblo region. (Figs. 30, 31, 32, 33.) They were used for working wood, specimens of which in process are shown. (Fig. 129.) P. G. Gates, of Pasadena, California, possesses a specimen which was bound up with a strip of wood showing the marks of work of this implement. The specimen was found in a cave near Soda Springs in the White Mountain Apache Reservation. The prevalence of these instruments is due to the abundance of suitable spalls of volcanic rock found in this region, while in northern Arizona rocks are almost altogether sandstone and other sedimentary strata.

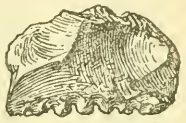
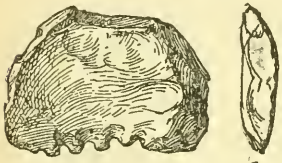


FIG. 30.—STONE SAW FROM JOSEPH, TULAROSA RIVER.



a b

FIG. 31.—STONE SAW FROM LUNA, NEW MEXICO.

DRILLS.

Drill points which have been found on the ruins differ not at all from the customary form of this implement in America. The material is commonly chert, chalcedony, and sometimes obsidian. Often the drill point is long and finely chipped and frequently the base is flared, as though it were used between the fingers as a gimlet. It is also possible that this large form of drill was not hafted. The size of the drill corresponds to the holes made in pottery for mending purposes, in bone, in the larger stone ornaments, and sometimes, though rarely, in wood. In the latter material a bone awl was employed. Several mounted flint drills were found.

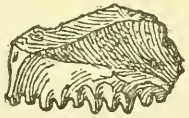


FIG. 32.—STONE SAW FROM APACHE CREEK.

Large drills or reamers were apparently not needed except occasionally for tubular bores in the cloud blowers and pipes.

The ordinary drill bit would not be suitable for finer perforations, which in beads are often very small, requiring a fine needle to carry a thread through them. (See p. 25.) The means used to produce the perforations are not definitely known, but they might have been a cactus spine, or slender splint of bone having enough burr to abrade the soft stone usually formed into beads.

FIG. 33.—STONE SAW FROM BLUE RIVER.

A sliver of hardwood when started to drilling in some stones will crush the structure under its point and by revolution this powder still further abrades continuously, needing only the addition of water to keep the drill from jamming or gumming. Harder stone requires abrasives whose use was well known by the Indians, and the character of the stone influenced the kind of drill.

A thorn, a thornlike branch, a cactus spine or a sliver of obsidian or chert might be used, the cutting end requiring to be of even caliber for a very short part of the length of the drill, as only thin pieces of stone were usually perforated, and commonly the bead blank or small object was drilled until the point appeared on the underside when it was turned over, the point set in the minute orifice, and the work completed. So far as can be known, the small points were set in a rod which was twirled between the palms.

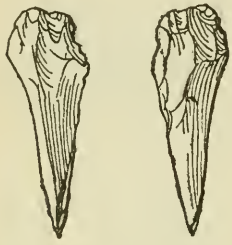


FIG. 34.—CHALCEDONY DRILL FROM SPUR RANCH.

The delicate, sharp-pointed fragment of white chalcedony 1 inch long from the Spur Ranch, Luna, New Mexico, is a type of the unworked drill. (Fig. 34, *a* and *b*.) A specimen (fig. 35) made from a thin spall of fine chalcedony, the base flaring for purchase in the fingers, shows more work. (Cat. No. 231973, U.S.N.M.; length, 1½ inches; Spur Ranch, Luna, New Mexico.) Other specimens from the same locality are milky chalcedony, the work only showing on the blade. (Fig. 36; Cat. No. 231816, U.S.N.M.; length, 1 inch; width, ¾ inch.) A better specimen is made of reddish-brown chert and has a neatly chipped blade and ovate finger grip. (Fig. 37; Cat. No. 232017, U.S.N.M.; length, 1¾ inches; ⅞ inch wide. Spur Ranch, Luna, New Mexico.) The finest specimen, an excellent example of flint chipping (fig. 38), was found at Spur Ranch, Luna, New Mexico. It is 2½ inches in length and was doubtless originally hafted. (Cat. No. 231874, U.S.N.M.)

FIG. 35.—CHALCEDONY DRILL FROM SPUR RANCH.

FIG. 36.—CHALCEDONY DRILL FROM SPUR RANCH.

BEADS AND ORNAMENTS.

Nowhere in America was the bead maker's art more developed than in the Pueblo region, and there is observed also in different parts of this area a diversity in skill and in the extent to which the work was carried. In general the zone of superior beadwork and minute stone carving lies between the Little Colorado and Gila Rivers, with extensions to the south in Sonora. In this zone the beadwork is greatly in advance of that in any other portion of this hemisphere, and it is probable that nowhere else in the world was as great proficiency displayed. This assertion regards the accuracy of calibration and of drilling, apparent ease with which minute beads and astonishingly fine perforations were

worked, selections of material, and combinations of colors, and, as far as the great collections of the United States National Museum are concerned, the assertion is valid. For example, the finest beads yet discovered is a string 4 inches long from Bear Creek Cave, Blue River, Arizona. The individual beads measure one-sixteenth of an inch in diameter and the perforation is one-thirty-second of an inch. The material is black steatite. From the same locality turquois beads measure one-twelfth of an inch with perforation of 0.023 of an inch. Larger beads measure three-sixteenths inch with one-sixteenth inch perforation. Examination of these beads under a glass shows their perfection of form.

FIG. 37.—CHERT DRILL FROM SPUR RANCH.

Within this area the centers of the best beadwork are: Upper Blue and San Francisco rivers, Tularosa Valley, Casa Grande in the Gila-Salt drainage, Chaves Pass on the northern slope of the White Mountains, and the Petrified-Forest region in the drainage of the Little Colorado. The character of the work and materials are as follows:

Blue River.—Travertine, white, cream, gray; shell; steatite, black, brown, transparent brown; turquois, blue, green; clay slate, red and brown; fluorite, yellow, pink shaded to purple. When found strung they are spaced and arranged according to colors and are perfect specimens of fine workmanship.

FIG. 38.—CHERT DRILL FROM SPUR RANCH.

Upper San Francisco River.—Finely worked zooic ornaments of shell, calcium carbonate, serpentine, and turquois; beads of travertine, steatite, and shell, often two-lobed. Polishing of chalcedony is sometimes practiced. (See p. 27.)

Tularosa River.—Carving in hard and fine-grain stone, serpentine, hematite, etc.; perforation of hard stone; mosaic or inlay of comparatively large plates of turquois. Shell carving; bonework.

Gila Valley—Casa Grande.—Shell carving, minute stone carving in turquois, etc. Beads of fluorite, turquois, red stone, soapstone, etc., shell.

Chaves Pass.—Very fine red clay slate; steatite; turquois; calcium carbonate; jet; gray limestone. These beads often require a very fine needle to string them. Finest mosaic work here and excellent shell carving and etched and carved bone.

Petrified Forest region.—Worked and polished chalcedony, agate, hematite, and other hard stone fashioned into conoids, cylinders,

and plates. This art extends from Zuñi north to the Puerco River to the mouth of that river above Holbrook, Arizona, and reappears in the valley of the Blue and Tularosa rivers. Beads in quantity made of travertine and shell. Small zooic carvings and beads of dark-blue steatite (Woodruff, Arizona).

PROCESS OF BEAD MAKING.

The process of making beads appears to be as follows:

Pieces of selected stone were rubbed into flat plates of uniform thickness, these bits were then taken between the thumb and fingers and the edge rubbed, turning the stone at intervals, thus leaving a polygonal figure six or more sided; the hole was drilled through this more or less regular disk; the disks were then strung tightly and drawn over a grinding surface, perhaps being rubbed to and fro by the hand, then were finished more accurately by being drawn through a groove between two fine-grain stones. While still strung they were polished by rubbing on skins, using fine gritty dust as a medium.

Most of these steps of the process are verified by specimens found in an incomplete state and by present observation as follows:

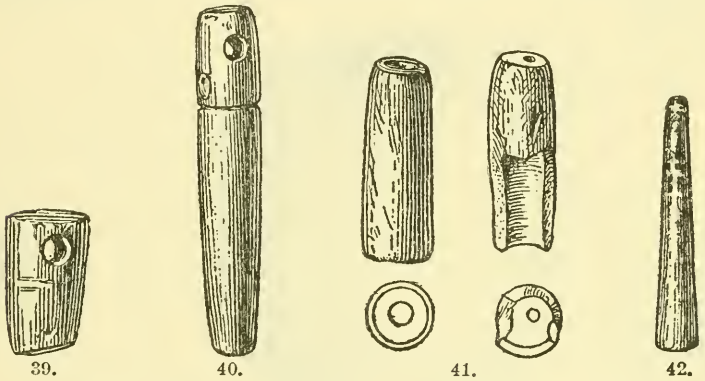
The Zuñi bead worker's materials, methods, and tools are very simple and consist of plates of turquois, calcite, and shell, a gritty lap stone for grinding, a pump drill with flint point, two grooved plates of stone for equalizing the beads, and string of sinew, cotton, or yucca fiber for assembling the finished product. The bead material employed commonly occurs in thin equal masses or plates from which the blanks are broken with a small stone and subsequently ground smooth on the flat sides and the edges finished roughly on the lap stone. The blanks are then held with the fingers on a flat stone anvil resting on the knee of the bead maker and drilled first on one side and then on the other. Sometimes a mistake is made in centering, the two cavities not accurately meeting. In this connection, let me add that the ancient bead worker drove two slanting holes into the flat side of a tablet or button-like object which he wished to suspend, and when the drill holes met a practicable passage for the cord was made. The next step was to string the beads tightly together on a strong cord and pull this rather rigid column of beads between two grooved strips of fine-grain sandstone, using plenty of water. This ground every bead to even size and gave a polish which was brought to a high brilliancy by wear around the neck of the Pueblo Indian.

The work on small ornaments or fetiches of stone is of a superior order like that practiced in fitting the parts of arrows. The examples, shown in fig. 43, page 28, would tax the skill of a lapidary supplied with the best tools and machinery of his art. On the ornaments mentioned, drilling, graving, the production of small circular depressions, etc., are found, and the workers manifestly had a keen

appreciation of form and character even more marked than that displayed by the Eskimo.

Cylinders, cones, disks, and objects of various forms in hematite, chalcedony, serpentine, and jasper, finely polished, have been found in the region, especially in the Tularosa Valley. (Figs. 39–42.) The disk of chalcedony (see fig. 48), chipped to shape and polished on one face is a remarkable object. It was found in a ceremonial room at the Spur Ranch, and it is supposed to be a mirror, used probably as are the facets of the rock crystal of the ancient Hopi for reflecting sunlight into the charm-liquid or "medicine."

One of the most remarkable and gratifying finds of the expedition of 1903 was unearthed in a crumbled ruin about one-half mile east of the house of Montague Stevens, owner of the Spur Ranch, near Luna, New Mexico. It was taken from beneath the floor near the corner of a room. The jar (fig. 43*a*) of brown pottery, so rudely



39. 40. 41. 42.

FIGS. 39, 40.—HEMATITE CYLINDERS, PERFORATED, FROM TULAROSA RIVER.
FIG. 41.—PERFORATED CYLINDERS FROM TULAROSA RIVER.
FIG. 42.—CONOID FETISH FROM TULAROSA RIVER.

fashioned that one would surmise that contrary to all precedents it had been formed by a man, was closed with a mass of clay, and on breaking the luting and turning out the contents into the hand one could hardly repress an exclamation of surprise at the character of the find.

The specimens (fig. 43) are as follows:

(*a*) 231838. Jar of brown pottery, 2 inches diameter; 4¼ inches high.
(*b*) 231839. Bird amulet of yellow-green serpentine.
(*c*) Small reniform bead of turquois.
(*d*) 231842. Amulet accurately cut from shell. It appears to represent an animal, but its meaning is conjectural.
(*e*) 231851. Bird-head amulet carved from turquoise. Two small carvings of this character were found at Bear Creek Cave, Blue River, Arizona, and there have been recovered from the great ancient town on the lower Tularosa (Delgar Ranch) a number of remarkable amuletic objects carved from rare and beautiful stone. In

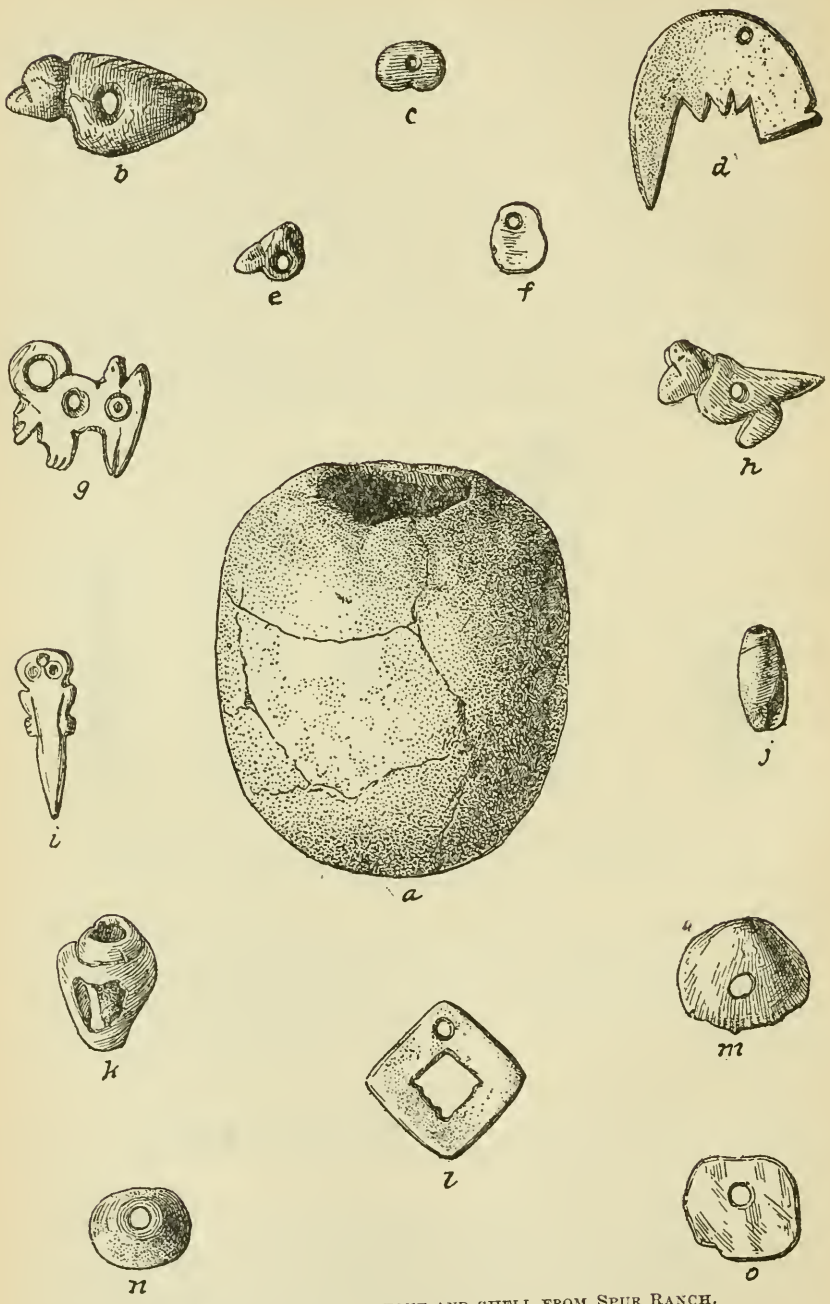



FIG. 43.—CARVINGS IN STONE AND SHELL FROM SPUR RANCH.

northern Mexico they appear to be more prevalent, and a comparison of the carvings just described with those figured by Dr. Aleš Hrdlička[1] suggest a connection of great interest. The amulets from Spur Ranch belonged, doubtless, to a medicine man. They differ widely from the medicine paraphernalia secured from a grave near the Petrified Forest of Arizona.[2]

(*f*) 231850. Small pendant of shell.

(*g*) 231840. Bird amulet of shell, well carved. This specimen is a rare but not unique example of ancient Pueblo fancy, being carved to represent two animals, and changes in appearance from a bird to a small mammal, or back again on inversion.

(*h*) 231841. Bird amulet carved from white stone.

(*i*) 231843. Tadpole amulet, exquisitely carved from fine white stone.

(*j*) 231849. Olive shell (*Olivella biplicata*), highly prized by ancient and modern Pueblos for beads.

(*k*) 231847. Shell, *Columbella*, prepared for stringing by breaking away the apex and forming a hole in the side.

(*l*) 231844. Shell amulet of square form, pierced for suspension by one corner, and having a square opening cut in the center. The specimen shows that the square was cut out by drilling around the margin of the figure. It appears to be a world quarter symbol and is usually represented having a bird at each quadrant (see fig. 92).

(*m*) 231845. Natural shell *Glycimerus*. Pierced for suspension.

(*n*) 231846. Shell of *Conus* species.

(*o*) 231848. Disk of pearly shell.

From the Tularosa Cave comes a disk of fine-grained red sandstone having a hole partly drilled through it near the edge. (Fig. 44.) It appears that this was an attempt to form an ornament for the necklace. (Cat. No. 246465, U.S.N.M.)

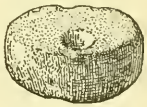


FIG. 44.—SANDSTONE DISK PARTLY PERFORATED FROM TULAROSA CAVE.

A cylinder of fine-grained purplish stone having five grooves cut around it was found in the Martin ruin. These grooves were sawed with a flint blade and the shape of the stone appears to be natural. Its use can not be determined, but it was probably a fetish. (Fig. 45.) A smaller specimen was found at Luna and one has been described[3] with illustration from Potts Valley, Santa Catalina Island, California. It is not known whether there is any relation between this object and the roundel sticks preserved in the caves. (Cat. No. 245931, U.S.N.M.; length, 2⅞ inches; Blue, Arizona.)

FIG. 45.—SCORED SPINDLE-SHAPE STONE FROM BLUE.

From the same locality also comes a small block of red lava in which designs have been scored. (Fig. 46.) (Cat. No. 231809, U.S.N.M.; length, 2 inches; width, 1⅛ inches; thickness, ½ inch.)

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[1] The region of the ancient "Chichimecs" with notes on the Tepecanos and the ruin of the La Quemada, Mexico. American Anthropologist (n. s.), vol. 5, No. 3, 1903, pl. 40.

[2] Museum-Gates Expedition, 1901. Ann. Rept. U. S. Nat. Mus., 1901, p. 313, pl. 43.

[3] U. S. Geographical Survey, Wheeler, 1879, vol. 7, p. 711.

Sometimes pottery was worked as stone. This piece (fig. 47) is remarkable for the amount of labor which has been expended in drilling, grinding, and finishing a fragment of pottery to produce a result requiring some ingenuity to interpret. It is a good example, however, of the working of pottery in the manner of stone, examples of which, usually quite simple, are observed in the spindle whorls, scrapers, and disks found with comparative frequency in the ruins in the Pueblo region. The carving appears to represent an animal or perhaps two and may be a puzzle figure. (Cat. No. 231814, U.S.N.M.; length, 1½ inches; width, 1 inch; Spur Ranch, Luna, New Mexico.)

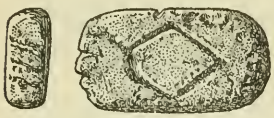


FIG. 46.—LAVA BLOCK WITH SCORINGS FROM BLUE.

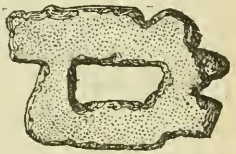


FIG. 47.—CARVED POTTERY ORNAMENT FROM SPUR RANCH.

### CRYSTALS AND REFLECTORS.

Quartz crystals are found among the house plans in every ruin, though the specimens are not plentiful. Occasionally they are found in graves. It is probable that quartz crystals were here used as among the Hopi fraternities for reflecting the sun's rays into the charm liquid employed in certain ceremonies.

FIG. 48.—CHALCEDONY MIRROR FROM SPUR RANCH.

An interesting specimen is a piece of translucent milky chalcedony worked into circular shape by pecking and chipping, ground down and polished on one surface which reflects with reasonable accuracy. (Fig. 48.) This was probably not a mirror for personal use, but was no doubt employed in ceremonies for throwing sunlight into the charmed medicine liquid, an office for which the facets of crystals are often found useful. The specimen was found in a large ceremonial chamber. (Cat. No. 231869, U.S.N.M.; diameter, 2¼ inches; thickness, 1½ inches; Spur Ranch, Luna, New Mexico.)

### CEREMONIAL MORTARS AND TABLETS.

These objects are made from tufa and are oftener round than square and necessarily, from the soft character of the material, would be of little use for active work. They are decorated with ceremonial colors on the exterior and are usually found in situations referring them to employment in ceremonies, more likely as receptacles for objects connected with the ritual than as mortars, their shape having given them this designation.

A shallow mortar from Blue post office is made from tufa and has convex sides. (Fig. 49.) The specimen is carefully finished both inside and out, and on the exterior are painted bands alternately red, yellow, and black. Cat. No. 245907, U.S.N.M.; diameter, 4½ inches; height, 2 inches.

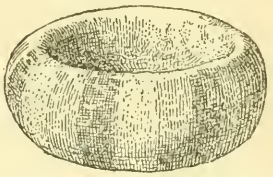


FIG. 49.—CEREMONIAL PAINTED MORTAR FROM BLUE.

Another painted mortar (fig. 50) is worked from soft brown tufa. The form is angular, the sides forming a terrace design painted in red. This mortar or dish was found with ceremonial objects in a large room in the Spur Ranch pueblo. (Cat. No. 231901, U.S.N.M.; dimensions, 4½ inches square, 2½ inches high.) A stone tablet (fig. 51) was also found in this room. It is painted in alternate bands of red and black, reminding one of the striped bodies of the Hopi *tihus*. (Cat. No. 231900, U.S.N.M.; size, 4⅛ inches long, 2 inches wide, and five-eighths inch thick.)

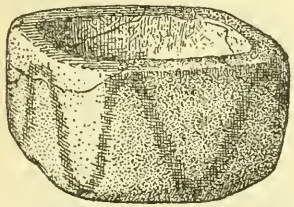


FIG. 50.—CEREMONIAL PAINTED MORTAR FROM SPUR RANCH.

PLAQUES.

The rectangular slabs of fine-gray stone with a shallow excavation on one face, usually bordered with a simple design in parallel or divergent groovings are peculiarly characteristic of the archeology of the Gila Valley and are especially abundant in the ruins on the fluvial plains of the river. South of the Gila, and in northern Mexico, to an extent not yet determined, but probably throughout the ethnic area of the Piman stock, these tablets occur, while north of the Gila they extend sparingly to the crest of the great breaks, beyond which they do not pass. Occasionally they take other forms, such as the bird form figured by Dr. J. Walter Fewkes.[1] They are supposed to have been connected with religious rites of the people, and Doctor Fewkes has suggested that they were originally painted with symbolic drawings and that they may be analogous to the tablets of the present Pueblo. Russell calls them magic tablets, and secured two from a medicine man.[2]

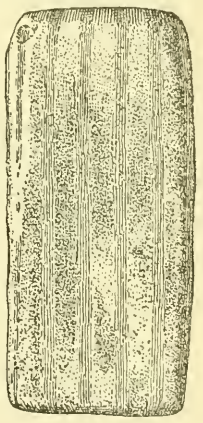


FIG. 51.—PAINTED STONE SLAB FROM SPUR RANCH.

One of these tablets was found at Spur Ranch, Luna, New Mexico. It is cut from gray fine-grained stone; the form is that of an oblong

[1] Two Summers' Work in Pueblo Ruins. 22d Ann. Rept. Bur. Amer. Ethnology, pp. 185–6.

[2] The Pima Indians. 26th Ann. Rept. Bur. Amer. Ethnology, p. 112.

dish, shallow and with a broad margin. (Fig. 52.) It is almost identical with the tablets found along the Gila River. (Cat. No. 231868, U.S.N.M.; dimensions, 3 by $1\frac{3}{4}$ inches.)

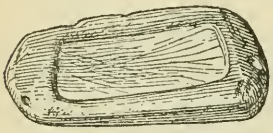


FIG. 52.—STONE TABLET FROM SPUR RANCH.

SCULPTURES.

Occasionally sculptures of exceptional form are found in this region. One of these (fig. 53) was secured by E. W. Nelson on the upper San Francisco River. It is the most noteworthy object of its class from this region, representing a turtle in high relief on a slab of brownish tufa. The specimen was removed by excavation from the ruins of a village. (Cat. No. 98715, U.S.N.M.)

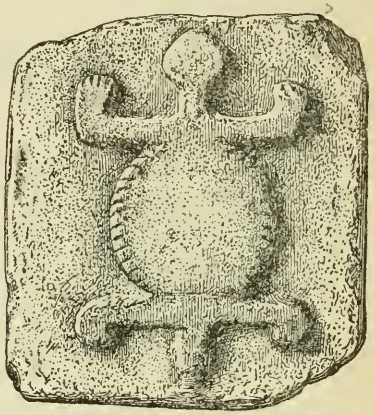


FIG. 53.—SCULPTURED SLAB FROM SAN FRANCISCO RIVER.

Two others from the same locality also show rather ambitious efforts at sculptures in the round. (Figs. 54, 55, Cat. Nos. 98203, 98714, U.S.N.M.)

A remarkable specimen in the National Museum is a small mortar of very hard rock, representing a coiled snake, and there is also a snake tablet from Cochise County, Arizona, the latter figured by W. H. Holmes.[1]

The Casa Grande ruin has furnished a number of excellent small sculptures. One of these, representing a mountain sheep, was collected by Cosmos Mindeleff. Other specimens collected by Dr. Aleš Hrdlička are in the American Museum of Natural History, New York.

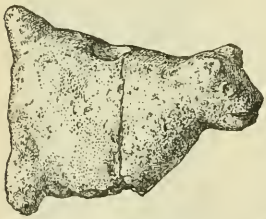


FIG. 54.—SCULPTURE IN FORM OF ANIMAL, SAN FRANCISCO RIVER.

An interesting sculptured tablet was found by Dr. J.W. Fewkes in the ruins at Solomonsville, Arizona.[2] In this locality, also, oblong dishes with two projecting nodes at either end, carved from very hard stone, are found, and may be considered as superior pieces of work in stone. (See fig. 11.)

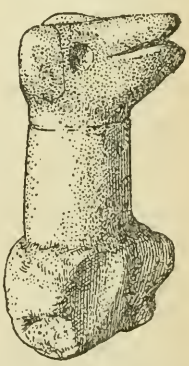


FIG. 55.—SCULPTURE IN FORM OF ANIMAL, SAN FRANCISCO RIVER.

A number of minute specimens in serpentine and other prized aboriginal materials are encountered. Several fine specimens of this sort are in the possession of George G. Heye, of New York. They were secured at the Delgar ruin, on the Tularosa River. In this connection, a

[1] American Anthropologist, vol. 8, n. s., No. 1, January–March, 1906, pp. 101–108.
[2] 22d Ann. Rept. Bur. Amer. Ethnology, p. 180.

small rude carving of tufa, representing some animal, probably a turkey, was found in a ruin at East Camp, New Mexico. (Fig. 56.)

### PICTOGRAPHS.

On the upper Tularosa at a point where the river enters a box canyon below Joseph, New Mexico, are smooth cliff faces decorated with numerous petroglyphs, which are generally very well drawn.[1] Many of these were figured by Henry Hales.[2] On the Blue River near the ranch of Henry Jones are figures representing bear tracks, deer, men, dragonflies, stars, and other objects, and along this river where smooth rock faces are encountered petroglyphs may be seen.

### PAINT STONES.

Occasionally evidences of pulverized paints are found in the graves and ruins, but commonly the ancient tribes retained the paint in its natural rock condition, as do the present-day Pueblos, and ground the masses on flat stone surfaces with some liquid medium, when the color was required. The ores from which paint was derived are copper carbonate, blue and green; kaolin and limestone, white; hematite, red and brown; iron ocher, red and yellow; carbon, black; tinted clays, pink and cream; and in very rare instances noticed on pottery, some agent, perhaps manganese, was employed to produce purple.

FIG. 56.—SCULPTURED ANIMAL HEAD, EAST CAMP, NEW MEXICO.

### SALT.

Sources of salt in a dry state are very few in this region. Salt River takes its name from the salinity of its waters derived from great salt springs which gush out into the stream at several places in its course. These sources, however, do not deposit salt and are besides very inaccessible. Zuñi salt lake, which was far but reached by comparatively easy trails across the mountains, was probably visited for this precious mineral. Hidden in a nook on top of the débris of Tularosa Cave was found a bag of lambskin sewn with sinew containing a hardened mass of Zuñi salt, showing plainly the depression formed by the pack strap. This bag was probably deposited there at an early day by Mexican herders.

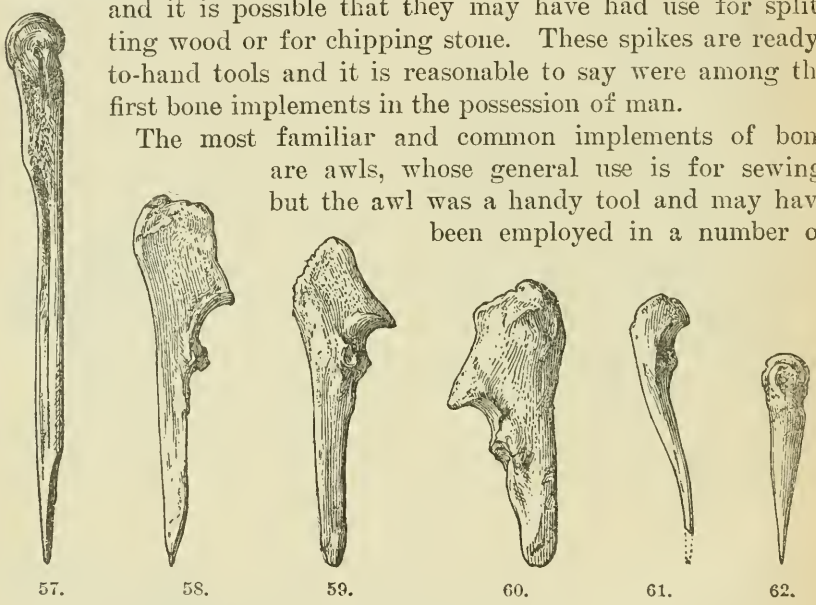
### BONE.

Art in bone was not highly developed in this section of the Pueblo region, though the resources were more largely animal than in

[1] Bull. 35, Bur. Amer. Ethnology, pl. 6, Washington, 1907.
[2] Smithsonian Rept., 1892, p. 535.

other areas. Bone implements here are entirely practical and rarely show effort at ornamentation or regularity of form and finish. They consist of sharpened splinters of bone or slender bones which appear to represent several implements, the commonest of which is the awl, having a sharp point and others with rounded or chisel-like extremities whose use is not suggested. A few fleshers made from large bones were found. Spikes from the antlers of the deer are frequently seen in the débris of ruins. They show wear and the points are blunt, wedge-shaped and scored, as though employed on a hard substance and it is possible that they may have had use for splitting wood or for chipping stone. These spikes are ready-to-hand tools and it is reasonable to say were among the first bone implements in the possession of man.

The most familiar and common implements of bone are awls, whose general use is for sewing, but the awl was a handy tool and may have been employed in a number of

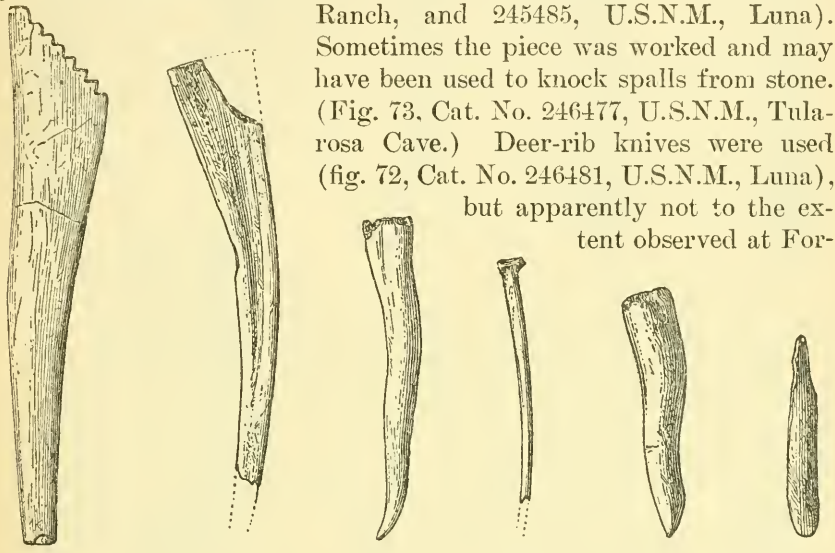


57. 58. 59. 60. 61. 62.

FIGS. 57–59.—BONE AWLS FROM SPUR RANCH.
FIG. 60.—BONE AWL WITH SPATULATE END FROM SPUR RANCH.
FIG. 61.—BONE AWL FROM TULAROSA CAVE.
FIG. 62.—SHORT BONE AWL FROM SPUR RANCH.

ways. The awls in the collection are mostly of deer bone, the fibula being preferred. The piercing end is short, slender, and effective (figs. 57–8; 61–2, Cat. Nos. 231834, 231887, *a*, *b*, *c*, U.S.N.M.; Spur Ranch and Cat. No. 246474, U.S.N.M., Tularosa Cave), or the working end is ground to spatulate edge (figs. 59, 60, 68, Cat. Nos. 231887, 231931, U.S.N.M.. Spur Ranch and 246476, U.S.N.M., Tularosa Cave.) A small bird bone comes from Luna (fig. 66), Cat. No. 246481, U.S.N.M. Two interesting specimens which appear to be awls widen out at the upper end and one of them is terraced (fig. 63, Cat. No. 76239, U.S.N.M., Upper San Francisco River, New Mexico, collected by

E. W. Nelson), and this feature may have been useful as a gauge for coiled pottery decoration. The other (fig. 64, Cat. No. 231887, U.S.N.M., Spur Ranch, Luna, New Mexico) is squared off at the top. The use of a spatulate edge awl-like tool is indicated in the exceedingly fine imbricated coil which was worked on the surface of some of the pottery of this region, and some of the specimens described may have been employed for the purpose. Spikes of deer antlers were ringed and broken from the antler and the point is sometimes natural (fig. 65, Cat. No. 246474, U.S.N.M., Tularosa Cave), or ground wedge-shape (figs. 67, 71, Cat. Nos. 232057, U.S.N.M., Spur Ranch, and 245485, U.S.N.M., Luna). Sometimes the piece was worked and may have been used to knock spalls from stone. (Fig. 73, Cat. No. 246477, U.S.N.M., Tularosa Cave.) Deer-rib knives were used (fig. 72, Cat. No. 246481, U.S.N.M., Luna), but apparently not to the extent observed at Forestdale and other ancient pueblos on the north side of the mountains.

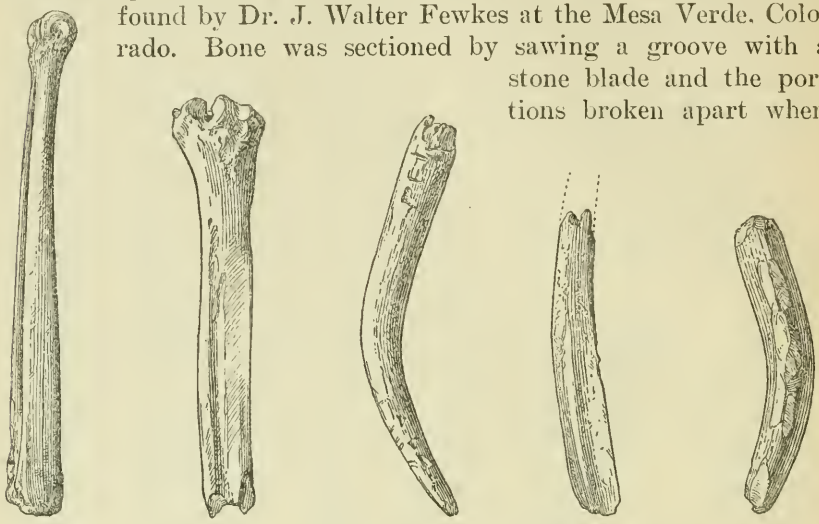


63. 64. 65. 66. 67. 68.

FIG. 63.—BONE IMPLEMENT, TERRACED, FROM UPPER SAN FRANCISCO RIVER.
FIG. 64.—BONE IMPLEMENT FROM SPUR RANCH.
FIG. 65.—ANTLER SPIKE FROM TULAROSA CAVE.
FIG. 66.—ANTLER SPIKE WITH CHISEL POINT FROM SPUR RANCH.
FIG. 67.—BIRD BONE AWL FROM LUNA, NEW MEXICO.
FIG. 68.—BONE AWL FROM TULAROSA CAVE.

Leather-working tools formed of long bones were found. One of these (fig. 70, Cat. 246477, U.S.N.M., Tularosa Cave) is ground on the face, forming a sharp edge for dressing leather; another (fig. 69, Cat. No. 231892, U.S.N.M., Spur Ranch) utilizes the sharp edges bordering the median groove of a deer's leg bone; and a third specimen is made by cutting diagonally the femur of a deer (fig. 74, Cat. No. 231890, U.S.N.M., Spur Ranch). This is in effect the graining tool

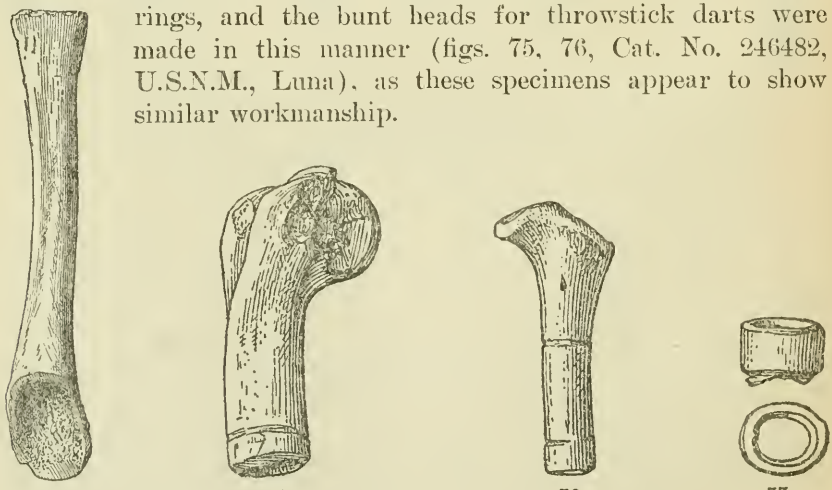
widespread among the American Indians, but simpler in conception. Excellent specimens of this scraper in the National Museum were found by Dr. J. Walter Fewkes at the Mesa Verde, Colorado. Bone was sectioned by sawing a groove with a stone blade and the portions broken apart when



69. 70. 71. 72. 73.

Fig. 69.—Leather-working tool of bone from Spur Ranch.
Fig. 70.—Leather-working tool of bone from Tularosa Cave.
Fig. 71.—Antler spike with chisel point from Luna, New Mexico.
Fig. 72.—Deer rib knife from Luna, New Mexico.
Fig. 73.—Antler punch from Tularosa Cave.

the cut was deep enough (fig. 77, Cat. No. 231970, U.S.N.M., Spur Ranch), and the edges finished by grinding on a stone. Bone beads, rings, and the bunt heads for throwstick darts were made in this manner (figs. 75, 76, Cat. No. 246482, U.S.N.M., Luna), as these specimens appear to show similar workmanship.



74. 75. 76. 77.

Fig. 74.—Leather-working tool of bone from Spur Ranch.
Figs. 75–76.—Bunt heads of bone for throwstick darts from Luna, New Mexico.
Fig. 77.—Bone rings from Spur Ranch.

SHELL

Shell had use only for ornaments, such as beads, bracelets, and tinklers. The uniformity of shell objects over the whole Pueblo region suggests that they may have been distributed from one locality where they were manufactured, though occasionally a specimen is found in process. Shells carved in the form of a frog are rather common in the Little Colorado Valley and on the Lower Gila, but are rare in the Blue River region.

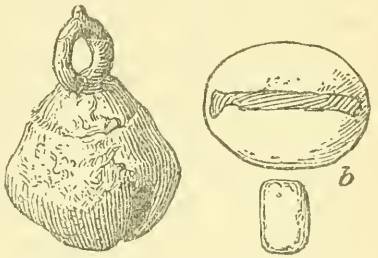



FIG. 78.—COPPER BELL FROM TONTO BASIN, ARIZONA.

Small Pacific-coast clamshells of graded size were found with burials of children at Blue, and the writer has noticed their occurrence with children's remains in other localities. So far as is known they have never been encountered in the graves of adults.

FIG. 79.—COPPER BELL FROM TULAROSA RIVER.

METAL WORK.

There is no evidence that the ancient Pueblos were acquainted with the working of metal, and it is apparent that they had slight knowledge of free metal of any character. Only at the Delgar ruin on Tularosa River has there been found a mass of native copper, probably brought from the Rio Grande, where it is found free. This mass had been rubbed and smoothed and treated in every way as a stone. The small bells, which have been found to the number of about 15 in Pueblo graves, were made in Mexico, and came as a valued article of trade through primitive commerce.

A small globular hawk-bell with stone sounder (fig. 78 *a*, bell natural size; *b*, view from beneath; *c*, stone sounder) was collected in Tonto Basin by James Douglas. (Cat. No. 173068, U.S.N.M.) This is the type of copper bell found quite generally distributed in the Pueblo region west of the Rio Grande.

Henry Hales collected the largest and most elaborately-worked bell that has been found in ancient ruins of the Southwest. (Fig. 79, *a*.)

The upper portion is built up of wire, the winding as in a coiled basket (fig. 79, *b*); the collar is formed in a similar way and is decorated with chevrons of straight lines (fig. 79, *c*); the globular portion, however, is not formed of wire but was drawn from a mass of copper by hammering, the slit being cut out afterward. The bell was made in three sections, the top with its staple, the collar with a raised band at its lower margin, and the globular body, and these parts were brazed together after the copper sounder (fig. 79, *d*) was inserted. The word "brazed" is used in the sense of cementation together of the parts by heat when inclosed in conjunction in a mass of fire-resistant founder's earth; the hollow of the bell was cored with the same material. The bell was made in Mexico where metal working was practiced, and was brought to the great ancient town in the valley of the Tularosa in the course of primitive traffic. It is an excellent specimen of ancient Mexican art in metal. (Cat. No. 170547, U.S.N.M.; diameter, 2 inches; length, 3⅞ inches; Delgar Ranch, Tularosa River, New Mexico.)

## POTTERY.

On the whole the region explored, with the exception of the Tularosa Valley, is not characterized by the great excellence observed in the ware found northeast of the Little Colorado. It is better than that of the Rio Grande Valley to the east and northeast, or the Gila Valley to the westward, where the ware appears to be affiliated with that of northern Mexico. On the north it grades somewhat into the pottery of the higher boreal slopes of the White Mountains, where brown and painted coil ware are the prevalent types. The decorative designs on the pottery of this region are of older type than those of the Rio Grande or those found on the pottery of the Pueblos who migrated westward from that river into Arizona and settled among the Pueblos whose pottery was decorated with the archaic conventionalized symbolism. The preponderance and broad development of coiled ware in this region also gives an older phase to its ceramic art, and illustrates best the artistic relationship of basketry and pottery.

### COILED WARE OF THE BLUE RIVER REGION.

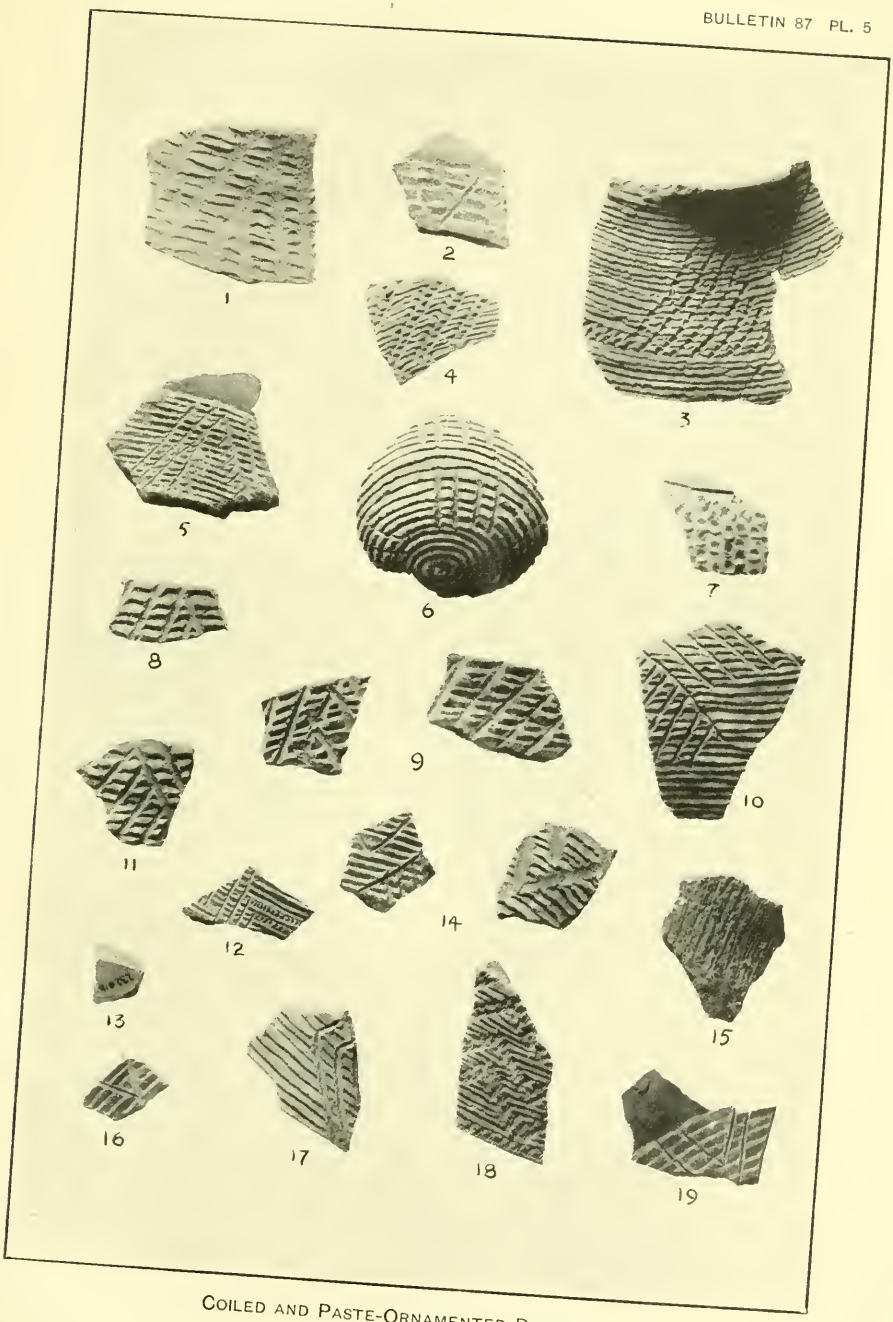
In regions where excellent pottery clay was at hand coiled ware was employed for cooking vessels. On the Blue River, however, where no such conditions prevail, coiled ware entered into all classes of uses and scarcely anywhere are more excellent examples of this work found. As is known, coiling arises from a structural method in which vessels are formed of ropes of clay applied spirally and

caused to adhere by pressure. In the final process of smoothing the vessel coiling is obliterated; but in the stage of construction the exterior of the vessel remains ridged, while the interior is smoothed, on account of the squeezing together of the clay there to make the coils adhere. It was customary to indent these ridges, producing in this way a rough but pleasing surface. The indentation was always made with the tip of the finger, and sometimes the asperities of the surface were reduced slightly by rubbing with a polishing stone. Such examples are quite common in the region west of the upper Rio Grande Valley, but are comparatively rare again in the Gila Valley and in the lower Gila and Mexico scarcely occur at all. The variety of coil which is typical of the Blue River region was formed by pressing down the coil into a narrow ridge, producing in this way an imbricated surface effect. The coil appears to have been formed with the finger, although in some cases a knife-like tool was used. The rough edges of these ridge coils were smoothed down. The result was a series of ridges, giving the vessel the effect of a basket; and by pressing these ridges at intervals with a tool patterns resembling those on baskets were formed. (See pl. 5.) Quite frequently patterns were made by drawing a blunt tool across the surface and supplementing this with small depressions at regular intervals. (See pls. 5, 6.) One excellent specimen of this type, a vase of large size decorated with impressions in the coil, from Spur Ranch, is shown. (Pl. 7, fig. 2.) The specimen was found sunken in the floor in the corner of a room which had been used for ceremonies. The vessel was covered with soot when found and had been put to domestic use before it was buried in the room. A similar jar was found in the corner of a room in a small cliff dwelling on the Rita Blanca above the Spur Ranch house, and specimens have been discovered at other places. (Cat. No. 231920, U.S.N.M.) This type is practically confined to the region described in this paper, but may, like the painted coil type, overlap the margins of neighboring geographical areas to a slight extent. In this region there are also found vessels whose surface is covered with partial coiling, the remaining surface being polished, this portion usually being the body of the vessel, while the coiling extends over the neck and down on to the shoulder. Frequently small bottle forms are decorated with fine coil patterns. The great variety of coiling and the prevalence of the simple but effective means of modifying it for decorative purposes render the pottery of this region extremely interesting, and since the ware is particularly subject to breakage entire pieces are rare. The fragments may be utilized to convey an idea of its value to the student of archaic designs. The fragments on plates 5 and 6 are mostly from the necks of vessels which carried the decoration, while the globular body was plain.

Plate 5, figures 1 and 2, which show scoring over imbrication, are from lower Blue River and Spur Ranch, respectively; 3 and 4, with ornamented imbrication, are from Blue and Tularosa; figures 5 to 17, with scored ornaments, are from Spur Ranch, upper and lower Blue and Tularosa rivers; and 18 and 19 are from the Tularosa Cave. On plate 6, 1 is of indented coil, Blue; 2, pinched wave coil, Spur Ranch; 3, scored and indented coil, Tularosa Cave; 4–5, coil pinched to form lumps, lower Blue River; 6, basket impression on unburnt paste containing pounded juniper bark, Tularosa Cave; 7, pinched wave coil, Spur Ranch; scored coil, Tularosa; 8 and 9, scored coil, Spur Ranch; 10, very fine indented coil, lower Tularosa; 11, scored coil, Tularosa Cave; 12, wave coil, Spur Ranch; 13, malleated surface like beaten copper, Tularosa Cave; 14 to 17, scored coil and bottom spiral of vessel, Spur Ranch; 18, lapped and pinched coil, lower Blue River; 19 to 21, scored coil, Spur Ranch. Some of the small rude offerings are ornamented with punch or finger-nail incisions. The finest examples of coil work are found in the Tularosa Valley, one unique specimen from this locality having a fret pattern excavated in the surface. From the Stevens Cienaga on Spur Ranch, at a ruin showing subterranean circular dwellings, there was discovered a unique vessel in fragmentary condition, having two upward curving handles, the ends of which are grooved. The vessel is dark brown and unpolished. (Pl. 7, fig. 1, Cat. No. 231831, U.S.N.M.)

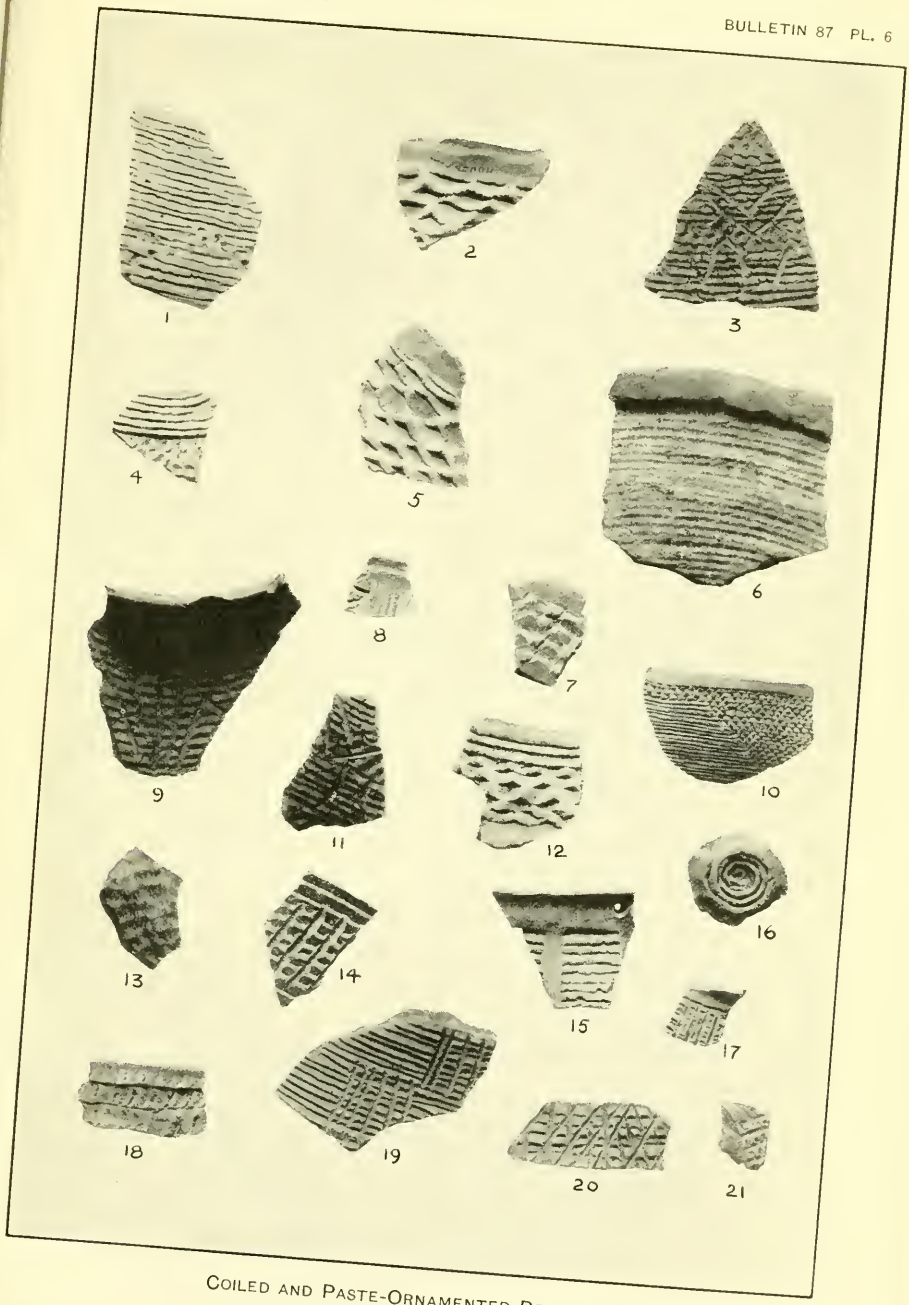
### BROWN WARE OF THE BLUE RIVER REGION.

The common ware of the Blue River region is brown in color, the paste rather coarse and weak and not sonorous in the finished product. It is made from the volcanic clays occurring along the streams and appears to have had no temper. These clays belong to the class called by the potters fat clays, susceptible of high polish on the unbaked ware, which was accomplished by the ancient potters by rubbing the surface with smooth stones. Bowls preponderate, and these are invariably a lustrous black on the interior, the process here being the same as that employed by the potters of the upper Rio Grande, especially at Santa Clara, where smothering in the fire in the presence of unconsumed organic material fills the pores of the vessel with carbon, producing an intense black. The process was known in Mexico and may be observed in the grayish-black ware of Oaxaca. Some of the pottery of the southern United States appears to have been made by the same process. Brown ware, like that of the Blue River, is found over the entire watershed of the Gila-Salt River, where it is typical, but it crosses the great ridge into the Little Colorado drainage at some points. A greater variety of forms than in other localities, however, is found in the ruins examined on the Blue River. The sole decoration of the bowls is a band of impressions, like those on coiled ware,



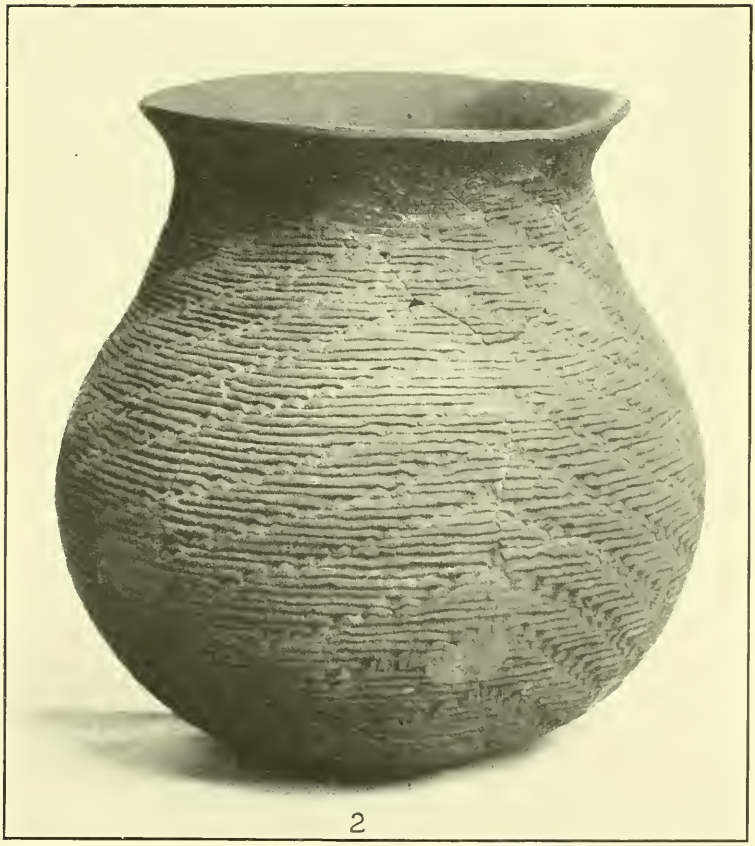

COILED AND PASTE-ORNAMENTED POTTERY.

FOR EXPLANATION OF PLATE SEE PAGE 40.




COILED AND PASTE-ORNAMENTED POTTERY.

FOR EXPLANATION OF PLATE SEE PAGE 40.




POTTERY VESSELS FROM SPUR RANCH.

FOR EXPLANATION OF PLATE SEE PAGES 39 AND 40.

just below the edge of the rim. This, for purposes of description, has been called fillet rim. In these ruins was discovered a variety of brown ware which occurs in only a few other localities of this region and which has not heretofore been described. These are bowls usually of a large size, with lustrous black interior, fillet rim, the exterior washed with red, on which maze designs in white lines have been painted. These vessels are even more fragile than the common brown ware, and rarely can a perfect specimen be secured. This ware seems to be related to the "painted on coil" ware found in a limited area north of the mountains, type-specimens of which have been described in the Museum-Gates Report for 1901 from the Petrified Forest of Arizona, and which seems to be localized at Linden, Arizona, on the high plateau at the headwaters of Silver Creek, an affluent of the Little Colorado.

The forms of the brown ware found at Blue, as indicated, are various, and consist of vases, bowls, bottle forms, numerous diminutive pieces, probably offerings to the springs, and animal shapes. Occasionally these objects are washed with red.

Several unusual vessels have been found in the ruins on Blue River, and so far as is known to the writer, the type is confined to this region. They consist of vases which are formed by erecting the neck portion from the interior rim of a bowl. As this construction was all accomplished while the clay was green, it not being possible to add to a vessel already baked, we seem to have here a suggestion as to the method by which vases may have been formed. It appears in many cases that the basis of the vase was a bowl, the closing over of the concave being effected in such a manner as to obliterate or soften down the junction with the edge of the bowl. Not much stress, however, can be laid upon this statement, which appears to be largely theoretical.

### GRAY WARE OF THE BLUE RIVER REGION.

The gray ware of the Blue River region has a coarse hard paste, burning dark gray to lead color. For this reason all specimens that have come to hand have been washed with kaolin, which in some cases has crackled in firing. The paste also has a tendency to distort on firing, so that it is rare to see a perfectly shaped bowl, but it is not so rare to see a vase of correct outline, since the latter form insures the greater stability in the kiln. There are in the gray pottery many evidences of carelessness in finishing the rims of vases and the edges and exteriors of bowls. The vessels also show a lack of delicacy in finish.

The designs are commonly of intense black pigment, though in some cases shades of dark brown occur. It is noticed that vessels which have been much worn from use show this brown color. Quite

frequently the pottery is marred by large smoked areas due to the fuel resting against it during the process of burning. It is evident that the fuel consisted of wood, the smoke markings being from angular pieces of charcoal.

The forms are: Bowls, always less than 10 inches in diameter; vases with loop handles, either flattened, twisted, or simulating animal figures, birds and heads of animals projecting from the rim. (Pl. 8, figs. 1 and 2, Cat. Nos. 736 and 741, Gates Coll.; Blue, Arizona.) The neck is occasionally quite tall in proportion to the body and usually taller than in specimens from the Tularosa. The prevailing type is globular, but sometimes the vessels are of bird or animal forms. One specimen especially, in the form of a plumed serpent, is remarkable (see figs. 81, 82, and 83) and another, a bird form, is an excellent example of taste, skill, and execution. A few dipper forms are found, but they are very scarce compared with other areas north of the mountains. Canteens holding about 3 pints are present in small number. The relative frequency of gray pottery in the Blue River region is about 12 per cent. The gray pottery of the Blue River is much inferior to that of the Tularosa River both in craftsmanship, accuracy of drawing, and in quality of paste.

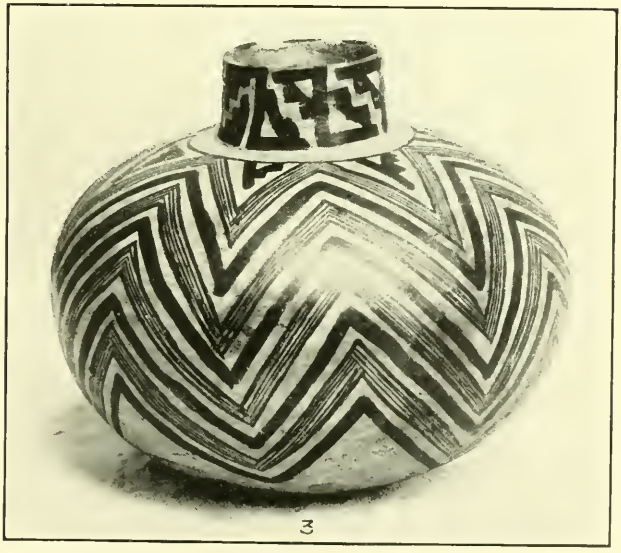
### GRAY WARE OF SPUR RANCH.

As one ascends out of the gorges of the Blue, Tularosa, and San Francisco rivers and mounts to the highland in which they arise, gray ware becomes very scarce, and little also has been found from the Datil Mountains on the east to the White Mountains on the west. From the neighborhood of Luna, New Mexico, a few specimens have been procured, and these in the main are related to those of the upper Blue River on the south, and possibly some of them may have been brought from that region. Several specimens, however, are unique. (See fig. 84, p. 47, also pl. 9, figs. 1 and 2.)

### GRAY WARE OF THE TULAROSA VALLEY.

On account of its exceptional situation and the fertility of its land, the Tularosa Valley maintained a considerable population in ancient times and, as if reflecting a life of abundance and isolation, there are found evidences of one of the highest cultures in the southwest. Gray ware was abundant here and excelled that of any other region. The paste is fine, and was dextrously fashioned into vessels which show the artist's appreciation of form and texture. The craft here also shows a greater inventiveness in the production of forms than is met with elsewhere. In scarcely any other region do we find so many examples of the pure white paste, which, if fired at a higher heat than was possessed by these Indians, might have produced a semiporcelain.

2

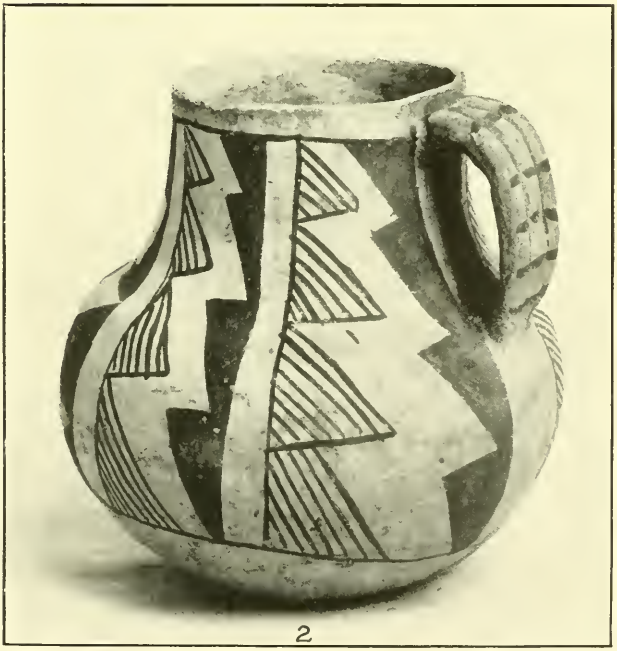


3

GRAY WARE FROM BLUE RIVER AND APACHE CREEK.

FOR EXPLANATION OF PLATE SEE PAGE 42.

1



2

GRAY WARE FROM SPUR RANCH.

FOR EXPLANATION OF PLATE SEE PAGE 42.

The decoration is varied and shows great skill in the combination of the symbolic elements at the command of the artist. The designs are in deep, often lustrous, black, and are well drawn. The center of the best Tularosa art was in the great pueblos at the lower end of the valley, while that of the smaller pueblos on the terraces about the valley is only of average quality. In the larger pueblos mentioned excellence was not confined to the gray ware, but all classes partook of the quality of craftsmanship. The brown ware, which is characteristic of the whole vast region treated in this paper, here also reaches its acme. No finer shapes or coiling can be found anywhere in the Southwest. The proportion of red ware also is slightly higher than in the pueblos where gray ware is prevalent, and this also is excellent in design and finish.

### GRAY WARE OF APACHE CREEK.

The gray ware of Apache Creek is of better quality and finish than that of Blue River, but not equal to that of the Tularosa, with which, however, it is closely affiliated.

The paste is coarse, usually almost lead color, but sometimes white. However, the paste was always washed with a kaolin white upon which the designs were drawn.

The forms are commonly vases with curved handles or animal handles, bowls, canteens, and a few aberrant shapes. (See pl. 8, fig. 3.) No animal forms were secured.

The decoration is in black; sometimes shading to dark brown, the patterns usually dual, but sometimes linear. The motifs are the customary interlocking frets so widely diffused on gray ware. The bowls have exterior decorations, which is somewhat unusual on gray ware. Sometimes this band of decoration is continuous or separate design units. The smaller bowls frequently have a curved handle at one side. The neck of one of the vases is ornamented with numerous stars. Frequently the ware is crackled. The percentage of gray ware is small compared with that of the brown and red.

### RED WARE OF BLUE RIVER.

The finds taken from the Martin Ruin at Blue contain a fair number of specimens of red pottery in most respects like that encountered in the ruins where gray ware preponderates. The red ware is in every respect like the gray, except as to the surface treatment. The paste is found to be the same, a granular mass varying from a dark to a light shade of gray, but sometimes being as yellow as that employed in the ancient Hopi pottery. The examination of a section of the pottery shows that the surface has been covered with a wash of clay, usually burning to a deep, pleasing red, but sometimes verg-

ing to a yellow brown. It may be said, however, that the individual specimens of red ware, for instance the bowls, are much larger than any specimens of gray ware which have been found in the ruin. The specimens are also of more elegant form and show no effects of warping in the fire.

The common form is a deep, incurving bowl (pl. 10, fig. 3), usually of large size, following in this respect the brown bowls. Vases with animal and loop handles; canteen or globular bottle shapes, and bird-form vases comprise the list of shapes. (Pl. 10, 1 and 2, Cat. No. 702, 697; Gates Coll.)

The decoration of the interior, except in one case, is invariably in black, the designs being almost altogether dual. Many of the bowls have exterior terrace and volute designs in white lines; one specimen which has a white interior decoration has a series of conventional birds painted on the exterior. Another has an individual diamond-shape pattern in black outlined in white. Still another has conventional birds applied in low-relief in red on a yellowish ground. The designs are almost invariably in fours. One excellent specimen is decorated with the four-bird convention in a circular field outlined by hachure and in the center of the bottom the same design repeated, but the birds mounted at the corners of the square are supplied with beaks and tails. The specimen is a remarkable example of the juxtaposition of geometric and realistic design. (See fig. 85.) A small bird-form vase in the collection is of excellent workmanship and is a good example of the skill of the pottery maker and decorator. The design upon it represents the dual interlocking birds, four in number, centering over the breast, the two wings and the tail. The handle at the neck is the head of an animal. In some cases it is difficult to separate the soft brown ware which at times has been washed with red, from the red ware which has been described. It may also be said that the red vessels have their counterparts in ancient sites widely separated from the ruins on Blue River. Both red and gray pottery have taken part in an extended distribution over the Southwest west of the Rio Grande and north of the Gila.

### RED WARE OF APACHE CREEK.

Some red ware has been found at Apache Creek and one specimen from the N. H. Ranch, presented by Mrs. Montague Stevens, has a pattern of exceptional interest, apparently representing four sun shields. This specimen is also of hard paste washed with red, the design being in black. (See fig. 91.)

### RED WARE OF TULAROSA RIVER.

In the Delgar Ruins on the Tularosa River some red ware has been secured. This ware is quite as well decorated as the gray, but owing

RED WARE FROM BLUE RIVER.

FOR EXPLANATION OF PLATE SEE PAGE 44.

POTTERY VASES AND BOWLS FROM FORT BAYARD, NEW MEXICO.

FOR EXPLANATION OF PLATE SEE PAGE 45.

to its fragility, not many whole specimens were taken out. It is also of gray paste, but more granular than usual, probably due to the character of the material employed.

### POTTERY OF UPPER MIMBRES.

The Museum was fortunate in securing from Mrs. W. O. Owen a small collection of pottery taken from ruins at Fort Bayard. This collection consists principally of the gray type, but having a different character from any such ware in the Southwest.

The paste is in no case the clear white or gray of some other localities, but is rather a brown body of somewhat fragile texture which has been covered with a wash of white. The pigment used in decoration burns to a beautiful red brown, due perhaps to the presence of yellow ocher in the iron ore employed for paint.

The shapes are bowls somewhat conical in form (pl. 11, figs. 6 and 7), occasionally with flaring rim and usually distorted in firing (fig. 5); globose bowls (fig. 3); pear-formed vases with two perforated lugs (fig. 2); flattened vases of fine coiled work with pairs of spur projections around the shoulder (fig. 1), and the ordinary coiled vases existing generally in the region (fig. 4). The globose bowl (fig. 3) (Cat. No. 178822, U.S.N.M.) is washed on the upper portion only. No decorations appear on the exterior of the bowls. The symbolism is simple and is executed in the hachure and solid color common to the gray pottery, but bands of lines are much used. There is much to connect this pottery with the Casa Grandes region of Chihuahua. It is said that bowls have been found in these ruins at Fort Bayard which contain zooic designs in the circular field at the bottom.

### POTTERY OF BEAR CREEK CAVE.

Illustrations of ware deposited as offerings are shown in figures 278 to 316, pages 117–122. They are of plain brown ware, sometimes washed red; coiled ware; and were decorated with water color, but no gray or pure red pottery vessels were found, indicating either a ceremonial proscription as to the class of ware to be used for offerings, or the absence of other types of pottery among the worshippers.

### POTTERY OF TULAROSA CAVE.

The pottery and pottery fragments found in the Tularosa Cave are of rude ware, and it appears that the Indians here did not possess any of the finer vessels common in the ruins a few miles lower down the river. The ware from the cave, however, is of the region and consists of plain brown. scored coil. and some that may be classed with gray type, but very rude, prevalent in the order named. A

curious fragment of a vessel molded in a basket, unburnt, and having the paste mixed with bark (see pl. 6, fig. 6) was found in the cave.

### POTTERY DESIGNS.

The designs on the bowls commonly contain four elements based on the world quarters, the bottom area usually being circular and blank. Designs, however, are met with based on three, five, and six elements. Only one bowl bearing an isolated design on the bottom area was collected (fig. 80, Cat. No. 245513, U.S.N.M., Blue River), and none of the gray bowls have exterior decorations. The designs, in order of frequency, are combined hatched and solid color, solid color, and checker, two cases of the latter being noticed. The dipper follows the bowl in the quadrate designs. The vases are usually decorated around the body with a repeat design of interlocking frets. Those pieces, which are decorated with the interlocking volutes, are invariably in fours. The bird and animal forms are decorated in consonance with the animal topography. (See figs. 81, 82, 83.) The patterns on the rims are almost invariably stepped,

FIG. 80.—DESIGN FROM BOTTOM OF A BOWL FROM BLUE.

FIG. 81.—SERPENT EFFIGY VASE (FRONT VIEW) FROM BLUE.

FIG. 82.—SERPENT EFFIGY VASE (BACK VIEW) FROM BLUE.

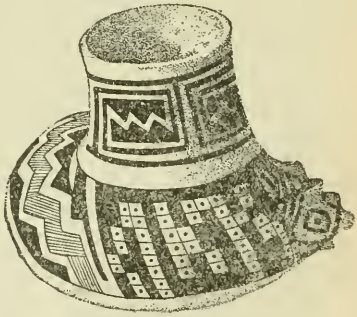


FIG. 83.—SERPENT EFFIGY VASE (SHOULDER VIEW) FROM BLUE.

although sometimes a running design or a design in sections is applied. The edge of both bowls and vases is frequently decorated with spots or hyphenlike figures. The handles of vases, if plain, have geometrical figures; if animal, are decorated accordingly. Occasionally the decoration on a plain handle indicates that a degraded animal form is present. Figures 81, 82, and 83 are of a remarkable vessel, representing the great plumed serpent, whose mythology extends among so many different tribes. Great care has been exerted in forming and decorating this vessel. The back of the serpent bears designs which embrace lightning, snake, and feather symbols, but the shoulder and tail patterns have an arrangement that is strange and appear to convey a hidden meaning. The head bears unique designs, of which the plume passing between the low horns is recognizable. The neck has a fret made up of lightning-snake and snake motives and the handle bears cloud symbols. Fragments of a similar effigy vessel have been found in the great ceremonial kiva of Pueblo Bonito, New Mexico,[1] and form one of several connecting links between that region and the Gila-Salt region. (Blue, Arizona, Cat. No. 245540, U.S.N.M.)

FIG. 84.—SNAKE DESIGN FROM BOWL FROM SPUR RANCH.

Another remarkable specimen (fig. 84) is ornamented with two snakes coiled about the interior. One snake is black and the other is patterned with diagonal lines, as though to represent the markings of the snake. The tails of these snakes begin at the rim and the heads are brought together at the center of the bottom, which is unusual, the customary method being to oppose and interlock such figures. The head is arrow-shaped, in solid black, having in the center a white area with a black dot for the eye. The exterior lead color surface is spotted with kaolin, evidently put on with the finger. This spotting does not cover the entire surface, a wedge-shaped clear space being left on one side. This bowl was for ceremonial use. (Cat. No. 231990, U.S.N.M., Spur Ranch Cienaga.)

Figure 85 shows circles inclosing a four-bird world quarter convention on a gradined background. In the center, as though interpreting the design, are four birds perched on angles of a square. (See Bird Circuit Symbolism, p. 103.) The bowl is bright red and well finished.

[1] Work cited on p. 50.

The design shows a hesitancy in the drawing of the inclination of the gradines. (Blue, Arizona, Cat. No. 245545, U.S.N.M.)

Figure 86 is from a well-made bowl, the walls being quite thin. The decoration is in dual pattern, the gradined element being painted

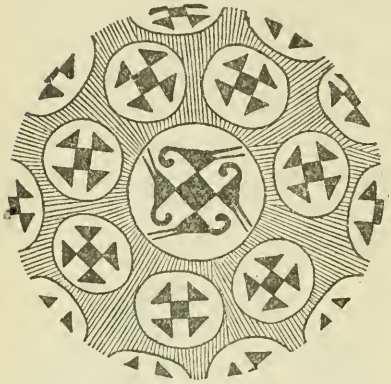


FIG. 85.—BIRD DESIGN ON BOWL FROM BLUE.

FIG. 86.—DESIGN ON BOWL FROM SPUR RANCH.

in purple. The color appears to be a thin transparent wash which does not interfere with the hatched lines. In the circular field in the bottom of the bowl is a four-bird convention. The specimen is from the Spur Ranch Cienaga, near Luna, New Mexico. (Cat. No. 232002, U.S.N.M.)

FIG. 87.—DESIGN FROM A BOWL FROM TULAROSA RIVER.

FIG. 88.—DESIGN ON VASE FROM SAN FRANCISCO RIVER.

A good design (fig. 87) is taken from a bowl found on the Tularosa River by Henry Hales. (Cat. No. 155151, U.S.N.M.) The motives are interlocking birds in three pairs, producing a design full of movement, and with a pleasing harmony in the relation of the white and black elements, worthy of the artists of the Japanese *mon* or crests. A design of superior order is shown in figure 88, which

represents a vase with animal handle from the upper San Francisco River in New Mexico, collected by E. W. Nelson. (Cat. No. 109773, U.S.N.M.) The design is in four, applied diagonally with great skill to the globular surface, and each section is in four bands of pairs of birds with interlocking bills. The backs of the birds are denticulated, giving the white space between the pairs a zigzag effect. This is also carried along the upper margin of each gore, and in the angle is a hooked figure. The neck of the vase is decorated with a fret which is an evolution of the bird pair motive. The confidence and mastery with which this complicated and difficult design is placed on the vessel is surprising.

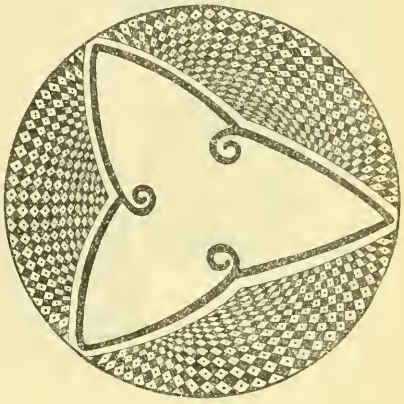


FIG. 89.—DESIGNS FROM BOWL FROM BLUE.

Figure 89 shows a design in three lobes outlined with black and terminating in three whorls, the background decorated with black and white checker diminishing in size toward the center. This is the conventional plumage motive, and it is possible that the design is a three-bird convention. From a bowl, Blue, Arizona. (Cat. No. 245508, U.S.N.M.)

FIG. 90.—DESIGN FROM A DIPPER FROM TULAROSA RIVER.

Figure 90 is a design taken from a dipper collected on the Tularosa River, New Mexico, by Henry Hales (Cat. No. 155157, U.S.N.M.), and is a very interesting example of the harmonizing of bird motives in an irregular space.

Figure 91 is from a beautiful red bowl of superior form and finish. The design, of which one repeat is given, has not been met with before and appears to be unique. The circular designs may be sun shields with feathers. (Apache Creek, Cat. No. 232083, U.S.N.M. Gift of Mrs. Montague Stevens.)

Another excellent specimen is in the form of a vase with low body and long tubular neck, to which is attached a handle. The bottom is punched upward. The decoration is in dual designs well executed. The paste of this vessel is fine, gray in color, and not crackled. (Spur Ranch, Cienaga, Cat. No. 232001, U.S.N.M.

(pl. 9, fig. 1).) The specimen is similar to those from Pueblo Bonito, New Mexico, discovered by George Pepper, of the Hyde expedition.[1]

Figure 92, bird design in dual treatment, forming volutes full of movement. The design is simple, owing, perhaps, to the form and area of the space to be covered, and this exigency has had as much to do with the simplification and conventionalization of designs as any other cause. (From a bowl found at Blue, Arizona, Cat. No. 245524, U.S.N.M.)

FIG. 91.—DESIGN FROM A RED BOWL FROM APACHE CREEK.

Figure 93, bird design, interpreted in cloud and rain forms, in solid black and gradined figures (dual treatment). The triangular figures above are feathers (wings). It is probable that the idea here is a combination of the bird and feathered serpent, the latter being represented by the black element of the volutes. (From a vase, Blue, Arizona, Cat. No. 245518, U.S.N.M.)

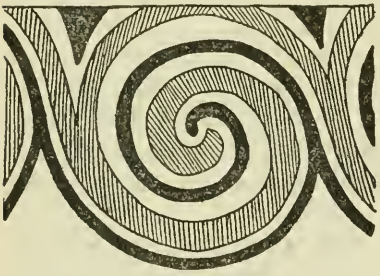


FIG. 92.—BIRD DESIGN FROM A BOWL FROM BLUE.

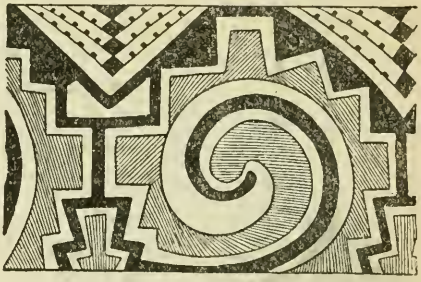


FIG. 93.—BIRD DESIGN FROM A VASE FROM BLUE.

Figure 94 is a more complicated design, made up of the dual interlocking bird frets running in two series. The result is mixed and less artistic than usual. (From a vase, Blue, Arizona, Cat. No. 245522, U.S.N.M.)

Figure 95, a terrace design entirely in black, the terraces representing the interlocking birds, and in the triangle above is apparently a symbol representing a bird, which occurs also in other designs. As the design is applied to the body of the vase, the lower

[1] Exploration of a Burial Room in Pueblo Bonito, New Mexico. Putnam Anniversary Volume of Anthropological Essays, New York, 1909, pl. 111, p. 206.

margin is irregular, the sections of the design forming gores. This was evidently intended as an artistic treatment of the border, as in point lace. (From a vase, Blue, Arizona, Cat. No. 244527, U.S.N.M.)

FIG. 94.—BIRD FRET FROM A VASE FROM BLUE.

Figure 96, a similar design, but less complicated, in which the interlocking bird elements are arranged in a maze pattern and the triangles carry the bird symbol. This pleasing design is from a vase from the Tularosa River. (Collected by Henry Hales, Cat. No. 155124, U.S.N.M.)

Figure 97, a dual design in which the original elements are very much simplified, being merely zigzag. The key, however of the

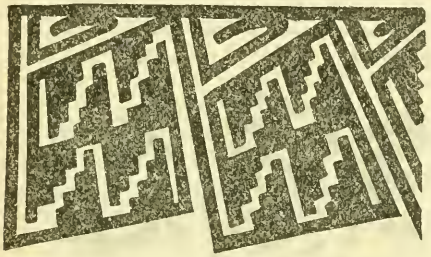


FIG. 95.—BIRD TERRACE DESIGN FROM A VASE FROM BLUE.

FIG. 96.—DESIGN FROM A VASE FROM TULAROSA RIVER.

design lies in the bird symbol in the pendent triangles occurring in several of the illustrations. Attention is called to an obvious error in the position of one of the bird symbols on the right of the design and also a curious diversity in the drawing of the gradines in the lower zigzag. (From a vase from the Tularosa River, New Mexico. Collected by E. W. Nelson, Cat. No. 115829, U.S.N.M.)

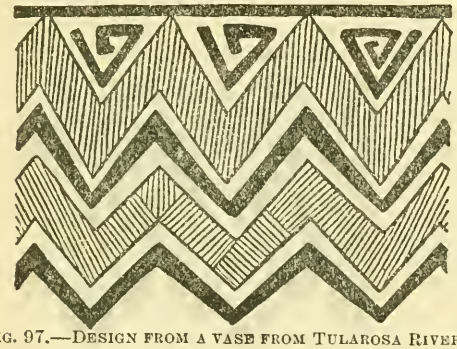


FIG. 97.—DESIGN FROM A VASE FROM TULAROSA RIVER.

Figure 98 is from the border around the neck of the above vase and the design consists of an arrangement of the bird symbol.

Figure 99, a somewhat similar arrangement of the bird symbols, but different from the latter in being connected, forming a pleasing

FIG. 98.—DESIGN FROM THE NECK OF A VASE FROM TULAROSA RIVER.

FIG. 99.—DESIGN FROM A BIRD-FORM VASE FROM SAN FRANCISCO RIVER.

fret. The design is from a bird-form vessel from the San Francisco River at Alma, New Mexico. Collected by E. W. Nelson, Cat. No. 109779, U.S.N.M.

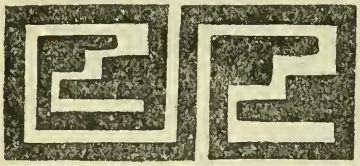


FIG. 100.—DESIGN FROM A VASE FROM BLUE.

Figure 100. In this is shown a square treatment of the bird design. (From a vase from Blue, Arizona, Cat. No. 245518, U.S.N.M.)

Figure 101, from a bird-form vase is the most spirited design that has been found in this region. It consists of volutes which are birds, and is strengthened and

FIG. 101.—DESIGN FROM A BIRD-FORM VASE FROM SAN FRANCISCO RIVER.

beautified by the addition of the wings and tails of the birds. This design is peculiarly interesting, because it is a definite key to the meaning of these interlocking volutes. (Alma, New Mexico. Collected by E. W. Nelson, Cat. No. 109778, U.S.N.M.)

FIG. 102.—DESIGN FROM A VASE FROM TULAROSA RIVER.

Figure 102. This design is easily seen to be the interlocking bird pattern, and it also presents another form of the bird symbol in the triangular areas above and below. From a vase from the Tularosa River. (Collected by Henry Hales, Cat. No. 155127, U.S.N.M.)

Figure 103 shows the same design repeated on the same vessel, this section of it being applied to the rim. The bird symbol is gradined

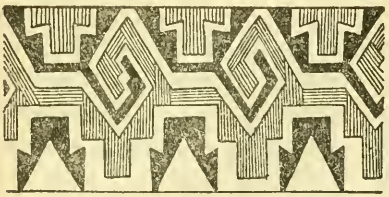


FIG. 103.—DESIGN FROM A VASE FROM TULAROSA RIVER.

and repeated in black, slightly different in form, below. (Tularosa River, New Mexico. Collected by Henry Hales, Cat. No. 155127, U.S.N.M.)

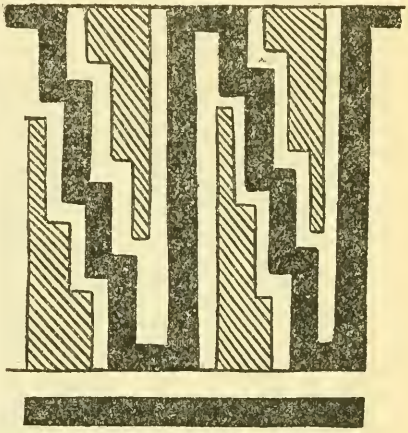


FIG. 104.—DESIGN FROM A VASE FROM SPUR RANCH.

Figure 104. This shows a very simplified treatment of the bird figures in dual design and was applied to the long, tubular neck of a vase from Spur Ranch, Luna, New Mexico, Cat. No. 232001, U.S.N.M.

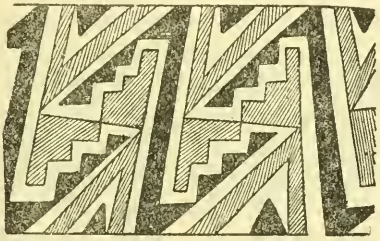


FIG. 105.—DESIGN FROM A VASE FROM APACHE CREEK.

Figure 105. This design occurs somewhat frequently on gray pottery of this region. It appears to be a design based upon birds, but does not follow either the conventional or artistic rules of such designs. It may be described as a rain-and-cloud design. (From a vase, Apache Creek, Tularosa River, New Mexico, Cat. No. 245772, U.S.N.M.)

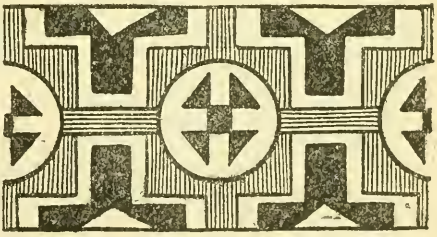


FIG. 106.—DESIGN FROM A VASE FROM SAN FRANCISCO RIVER.

Figure 106. This pleasing and artistic design is based upon four birds, the key symbol of which occurs in the center of the gradine squares. For a very interesting working out of this design, see figure 85. (From body of vase, upper San Francisco River, New Mexico. Collected by E. W. Nelson, Cat. No. 114870, U.S.N.M.)

Figure 107. This design in solid black represents two birds in terrace form, the zigzag line representing the running element of the design. The broad area of the terrace contains modifications of the bird symbol. (From the interior of a bowl, Blue, Arizona, Cat. No. 245503, U.S.N.M.)

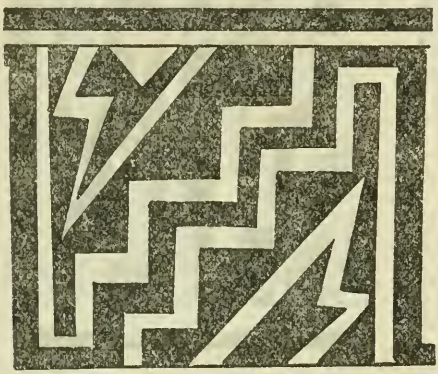


FIG. 107.—DESIGN FROM A BOWL FROM BLUE.

Figure 108. This design, which is a section of that covering a whole vase, apparently is intended to show a succession of zigzags formed by alternate opposed series in solid black and gradine. (Spur Ranch, Luna, New Mexico, Cat. No. 231987, U.S.N.M.)

Figure 109. A similar design is found on the rim of a vase (fig. 104), and in it the zigzag line is manifestly important. The triangular spaces show the simplest form of the bird symbol. (Spur Ranch, Luna, New Mexico, Cat. No. 232001, U.S.N.M.)

Figure 110. Another design shows a pair of zigzag lines treated very much as the white line decorations on the red bowls from the Blue River. This is from the rim of a vase found at Fort Bayard, New Mexico, by Mrs. W. O. Owen, Cat. No. 178826, U.S.N.M.

Figure 111. This is a design simplified for application to the handle of a dipper. It apparently represents a succession of opposing black and gradine bird symbols whose opposition forms a zigzag. The denticulation on the margin of the triangles is apparently a feather convention. (Tularosa River, New Mexico. Collected by H. Hales, Cat. No. 155158, U.S.N.M.)

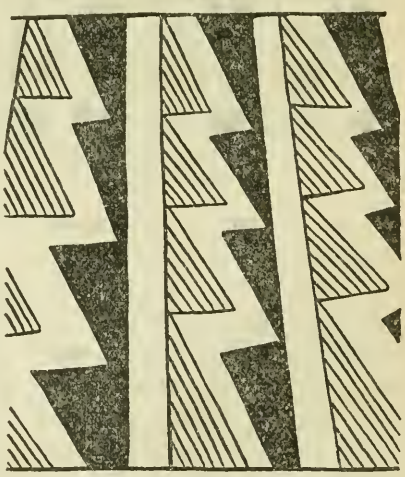


FIG. 108.—DESIGN FROM A VASE FROM SPUR RANCH.

Figure 112, design from the handle of the dipper previously mentioned. So far as is known the design is unique and it is difficult to assign its meaning. It is evidently a clipped or abbreviated design suited to the narrow space it must occupy, and appears to be the bird-rain triangular symbol arranged centrally, instead of in zigzag.

Figure 113. This design is from the rim of a globular vase, and is therefore abbreviated, and does not seem to follow the ordinary rules

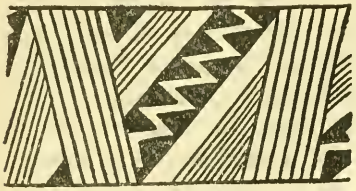


FIG. 109.—DESIGN FROM A VASE FROM SPUR RANCH.

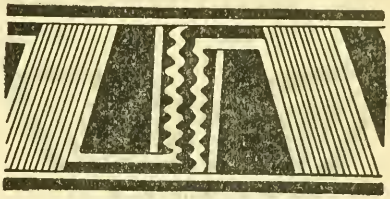


FIG. 110.—DESIGN FROM A VASE FROM FORT BAYARD.

to which designs of birds adhere. It is, however, a bird convention. (Tularosa River, New Mexico. Collected by Henry Hales, Cat. No. 155124, U.S.N.M.)

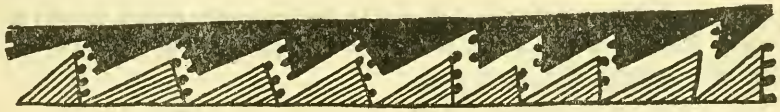


FIG. 111.—DESIGN FROM THE HANDLE OF A DIPPER FROM TULAROSA RIVER.

Figure 114. This design is from the breast of a bird-shape vase and belongs to the class of zooic topographical designs which may be

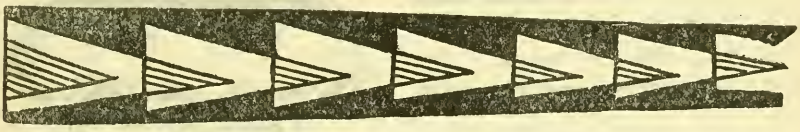


FIG. 112.—DESIGN FROM THE HANDLE OF A DIPPER FROM TULAROSA RIVER.

observed on a number of figures in this report. These are very interesting and appear to be related in some way, not only to the representation of the topography of this portion of the bird, but to convey an idea of the separate entity of these parts. (Blue, Arizona, Cat. No. 245535, U.S.N.M.)

FIG. 113.—DESIGN FROM THE RIM OF A VASE FROM TULAROSA RIVER.

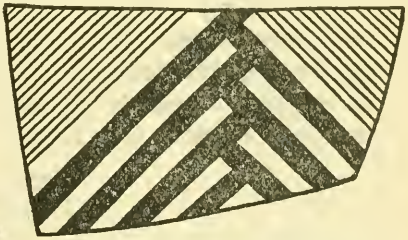


FIG. 114.—DESIGN FROM A BIRD-SHAPED VASE FROM BLUE.

Figure 115. This is one of the designs that appear rarely without combination. It is from a bird-shaped vase and apparently represents plumage. (Blue, Arizona, Cat. No. 245535, U.S.N.M.)

Figure 116. This is an independent design occuring on a hard-burnt bowl of red ware. It resembles some of the designs in white

line occurring on the soft red bowls (see fig. 125). (Blue, Arizona, Cat. No. 245546, U.S.N.M.)

WHITE-LINE DESIGNS OF BLUE RIVER.

The designs drawn in white lines on the red-brown bowls of upper Blue River form a unique series. But two specimens among the white-line pottery bear recognizable animal designs. One of these from a bowl (Cat. No. 245639, U.S.N.M.) is a most interesting convention of the mountain lion whose figure is reduced to straight lines and equal spacing. (Fig. 117.) The grouping of the feet as if in perspective and the convention of the head are noteworthy, and these parts are reduced to design units which would form the key to further elaborations of this motive in frets. Another bowl (Cat. No. 245553, U.S.N.M.) has a series of five conventional birds drawn in white encircling the exterior rim (fig. 118). The customary designs consist of running frets of two or three lines alternately straight and waved (figs. 119, 120) or stepped (fig. 121); a running one-line maze (fig. 122); a terminating trapezoid fret (snake) (fig. 123); a swastika fret with waved terminals in a trapezoid figure surrounded with a waved border (fig. 124); a key swastika maze in which the circumscribing lines enter forming interlocking keys (bird) (fig. 125); and a swastika with stepped terminals inclosed in trapezoid surrounded with a zigzag border (bird) (fig. 126).

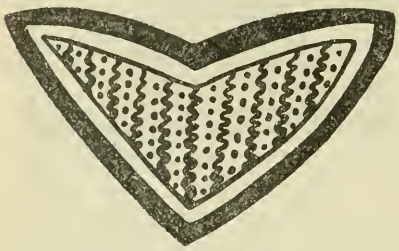


FIG. 115.—DESIGN FROM A BIRD-SHAPED VASE FROM BLUE.

FIG. 116.—DESIGN FROM A RED BOWL FROM BLUE.

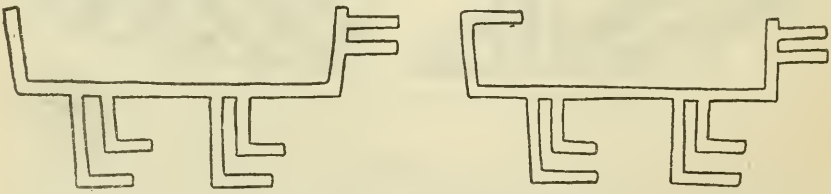
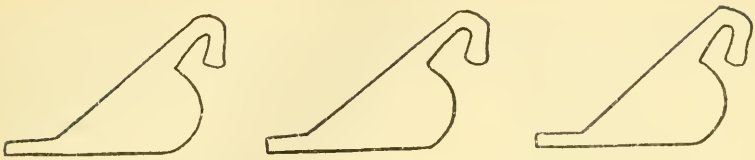


FIG. 117.—DESIGN FROM A BOWL FROM BLUE.

Some of the designs are rude (fig. 127), but usually the trapezoid compositions are elaborate and drawn with accuracy.



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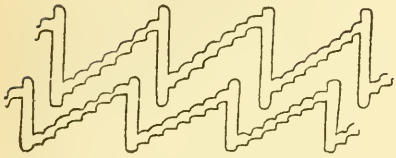

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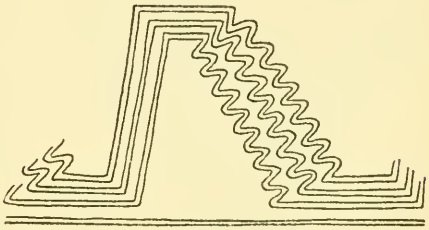

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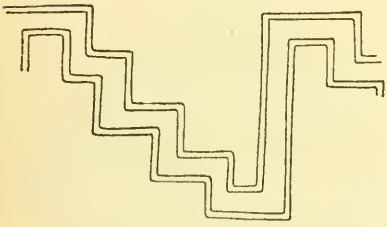

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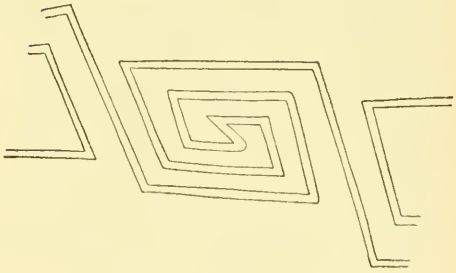

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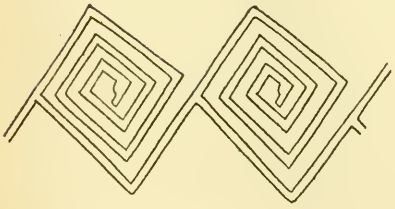

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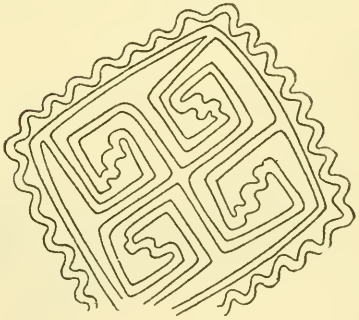


124.

FIGS. 118–124.—DESIGNS FROM BOWLS FROM BLUE.

## WOOD.

In this region the chief demand for large masses of wood was for house beams, and whenever possible straight-growing trees were selected, the cottonwood wherever it was to be had answering the purpose in most cases, formerly as at present. The most available tree in the mountains was the pine, the felling of which offered little difficulty when fire was used.

FIG. 125.—DESIGN FROM A BOWL FROM BLUE.

The cliff-dwellings of the Gila-Salt drainage were of one story, the roof being formed by the overhang of the rock, and for this reason the beams, poles, and masses of branches, grass, etc., of the open-air pueblos were not always required. Occasionally, however, a rough post of juniper, quite irregular in shape, is planted in a wall.

Smaller wands and poles for roof structures, etc., were cut along the streams, the method apparently being to bend over the sapling and scrape and saw with a sharp edge spall or chipped implement, the cutting being expedited by the straining of the wood fibers at the point of bending. This process was operated on the other side of the sapling which could then be twisted or worked apart. Butts of rods remaining in the caves seem to indicate this method of work.

FIG. 126.—DESIGN FROM A BOWL FROM BLUE.

The twigs were removed from the rods intended for basket rims and saplings were cut for bows, etc., by means of the stone knife, and the rods were subsequently ground down on abrading stones, but rarely leveled, the usual result being rounded projections over the insertions of the twigs, and, in the case of the bow, giving greater strength and durability.

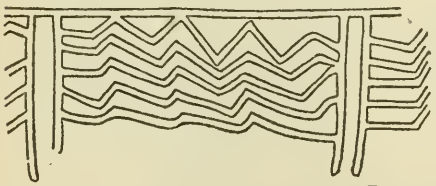
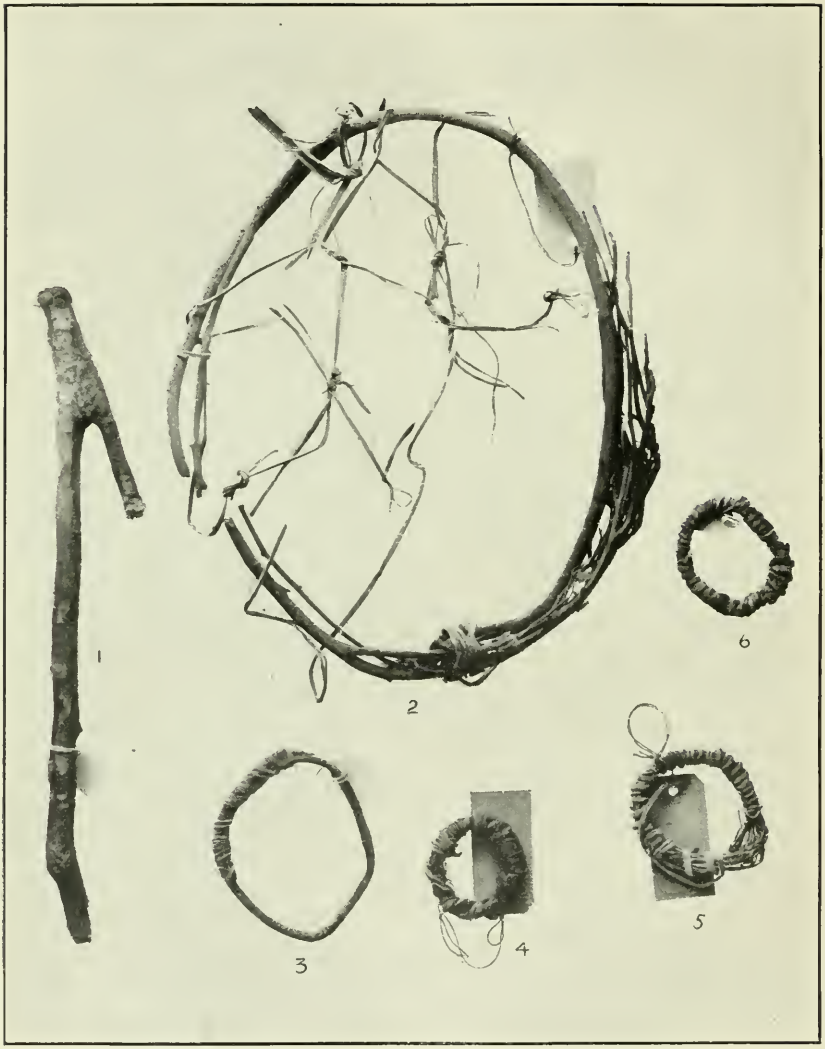


FIG. 127.—DESIGN FROM A BOWL FROM BLUE.

A material of the greatest usefulness was found in the flowering stalks of yucca, dasylirion, and agave, which are light, strong, and of good length, especially the agave flower stalk. The dasylirion




BENT WOOD RINGS AND WOODEN HOOK.

FOR EXPLANATION OF PLATE SEE PAGE 59.

and agave stems could be readily split, forming miniature boards, which were used in preparing different offerings. (See figs. 218–221.) Many pieces of the flowering stalk, split in halves as well as whole pieces, were found in Tularosa Cave.

Occasionally in the Tularosa Cave small bundles of basket splints were found. These retain the inner bark on one side and, like those of Canyon del Muerto and Mesa Verde, were stripped from slender, freshly cut rods of some tough fissile wood. The Tularosa splints are smoothly finished on the wood side, and the marks show that they were laid on a flat surface and finished with a fine-grain stone. A method quite common in this region of reducing a branch to the equivalent of a rope was by twisting the wood until it became soft, in the manner of the old English fagot gatherer, and many of the twisted and looped branches from the Tularosa Cave resemble fagot ties. From Lower Johnson Cave, Blue River, Arizona, there is in the collection a rude hook, 9 inches long and 4½ inches wide (fig. 128), made by bending a tough green branch on itself to the shape of a hook and tying parts together with strips of yucca. It was probably used for lowering or drawing up things over the cliff which falls almost sheer for many feet below the mouth of the cave. (Cat. No. 246197, U.S.N.M.)

FIG. 128.—HOOK MADE OF BENT AND TWISTED BRANCH FROM BLUE RIVER.

Bending wood by heat was known, and a number of the examples of crooks show traces of fire. (See pl. 19.) Examples of bent wood and a hook are shown on plate 12. Figure 1 is a hook showing rude work, probably used as a wall hanger in the house (Cat. No. 246451, U.S.N.M.); figure 2 is a hoop crossed with a rude netting of yucca splints, probably for suspending food or perishable objects from the ceiling away from rodents. (Cat. No. 2159, U.S.N.M., from a cave on upper Eagle Creek, Arizona.) Figures 3, 4, 5, 6 are hoops of yucca and branches lashed and wound with yucca. (Cat. Nos. 246364, 2156, 2153, and 246365, U.S.N.M., Tularosa Cave and Eagle Creek.)

Sometimes rings of bark were removed from rods alternately, the purpose seemingly being that of ornamentation.

Gathering firewood appears to have been accomplished by breaking branches from juniper trees by means of a large stone maul. On several occasions these large mauls have been found in juniper groves away from villages, and as the wood of this tree is very brittle, the connection of this implement with wood gathering is probable.

The most numerous and the best examples showing the process of cutting wood were found in the Tularosa Cave. The rejected scraps of sticks, with a bunch of shavings at one end, are mute testimonies of the manner in which the cutting was done. In sectioning a stick of tough wood the workman, with a suitable sharp stone flake or hafted knife, pared off strips by scraping pressure, following the direction of the grain, until a slender spindle was left, which could be easily broken without slivering. (Figs. 129, 130, Cat. No. 246452, U.S.N.M.) In most cases a spindle end was desired, as in pahos and bows, for example. A well-finished wooden pin, the shavings left at the upper end and compressed by driving the pin, is shown. (Fig. 131, Cat. No. 246453, U.S.N.M.) In short-grain, brittle wood like juniper, sectioning was done by sawing. (Fig. 132, *a*, *b*, Cat. No. 246453, U.S.N.M.) Short cylinders were made by scraping as described, the shavings being later removed from the blunt end; the stick was then reversed and the same process followed with regard to the other end, the splinters and roughness cut away with a flint, and the ends rubbed smooth on coarse stone. (Figs. 133, 134, 135, Cat. No. 246449, U.S.N.M.) In what appears to be the bunt head for a throwing shaft, such as are described by George Pepper, from Pueblo Bonito, the spindle end remains. (Fig. 136, Cat. No. 246449, U.S.N.M.) A small block (fig. 137 *a*, *b*), probably a die used in a game, shows ex-

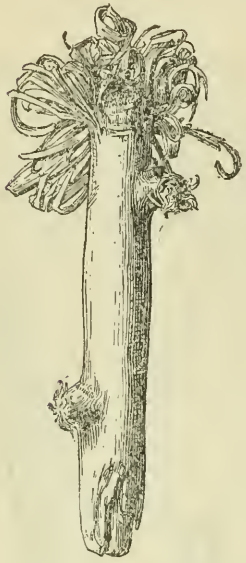


FIG. 129.—EXAMPLE OF SECTIONING WOOD FROM TULAROSA CAVE.

FIG. 130.—EXAMPLE OF SECTIONING WOOD FROM TULAROSA CAVE.

FIG. 131.—WOODEN PIN FROM TULAROSA CAVE.

tremely neat finish and has been split from its fellow. Reducing wood to thin strips by splitting was apparently not practiced at the Tularosa Cave, but the offerings at the Bear Creek Cave, described on page 105, show that the practice was common among the worshippers there.

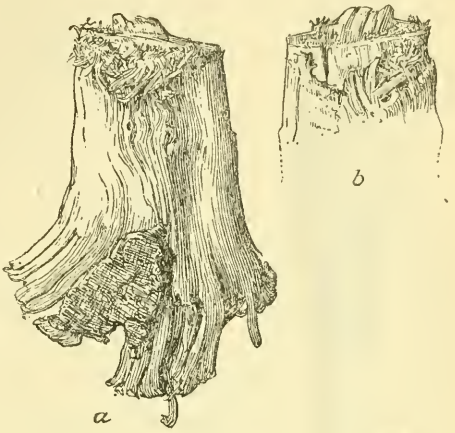
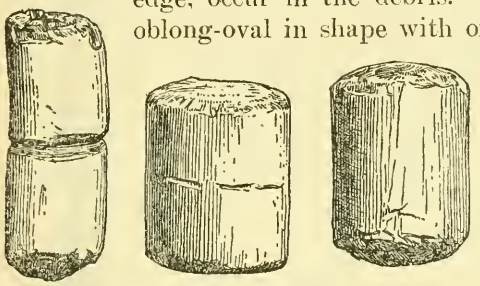



FIG. 132.—SAWING ON BRITTLE WOOD FROM TULAROSA CAVE.

Beyond the hafted stone knives or dart heads (fig. 138, Cat. No. 246537, U.S.N.M., $5\frac{1}{4}$ inches long, blade $1\frac{1}{2}$ inches long) no formal tools for woodworking are found in the Tularosa Cave, but many hand spalls of chalcedony and basalt, some of which are chipped along one edge, occur in the débris. A most effective knife-saw, oblong-oval in shape with one straight edge serrated or smooth, is common over a great area on the southern Arizona mountain slope. A specimen in the collection of P. G. Gates, found in the upper waters of the Salt River in the San Carlos Reserve, was bound up with a piece of wood which the saw had been used in cutting and deposited with a burial in a cave. This interesting specimen corroborates the use of the serrated flake as a woodworking tool. (See figs. 28–33.)



133. 134. 135.

FIGS. 133–135.—CYLINDRICAL BLOCKS FROM TULAROSA CAVE.

No evidences of drilling wood were found in this locality, but examples are noted from Blue River. Pretty generally fire-pointed sticks occur in the southern caves, but have no special significance, as

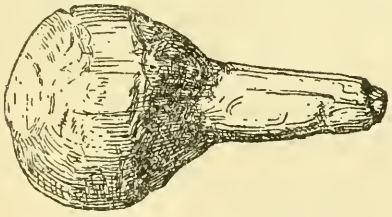


FIG. 136.—BUNT HEAD FOR THROWDART FROM TULAROSA CAVE.

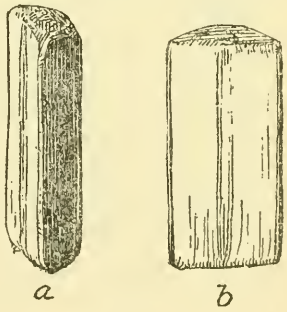



FIG. 137.—WOODEN DIE FROM TULAROSA CAVE.

the custom of fire hardening wood is well-nigh universal. Similarly, the finishing and shaping wood by means of coarse-grained stone is observed here and stones bearing grooves both effecting the rubbing of rods and formed in the process are relatively frequent (see fig. 17) and may often be seen on stones in places near habitations. The grooved stones used for finishing arrow foreshafts or other slender rods are simple compared with the elaborated specimens from the Gila Valley.[1]

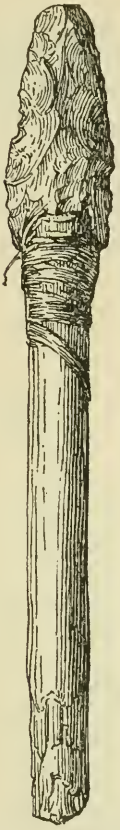


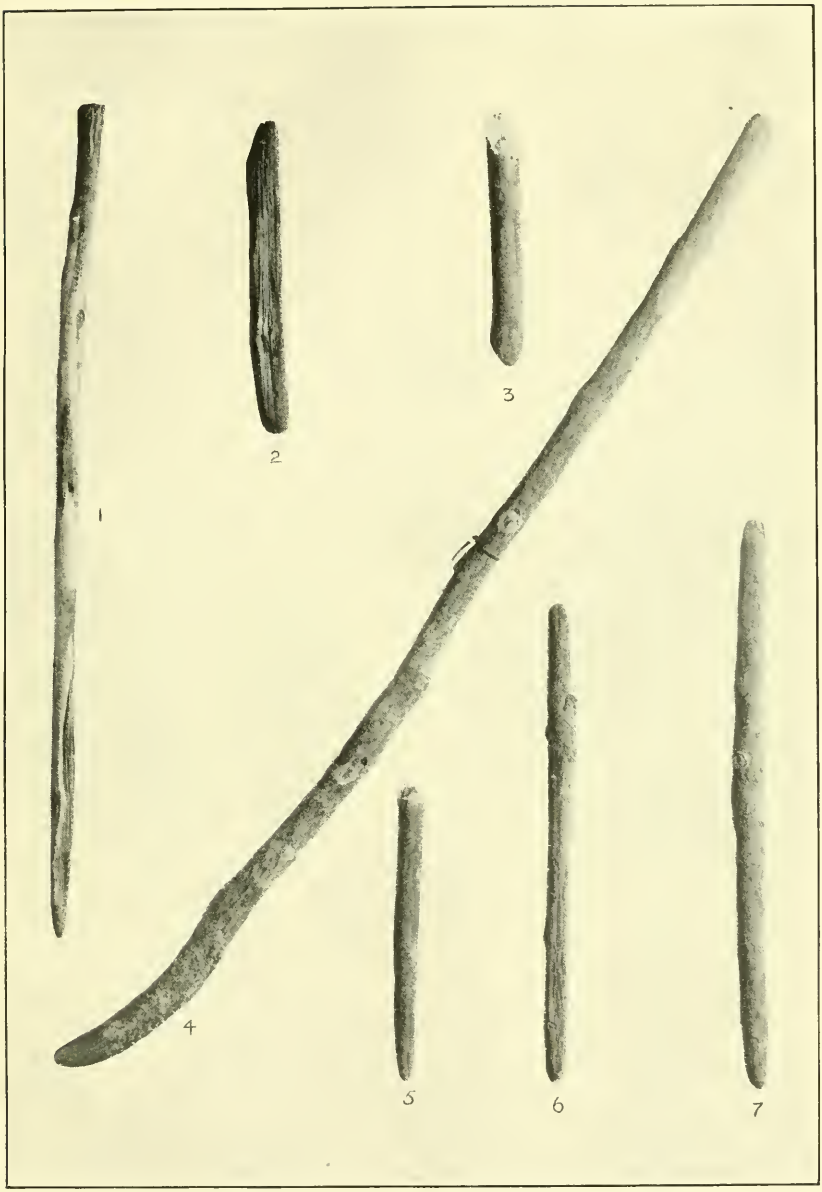
FIG. 138.—STONE KNIFE OR DART HEAD FROM TULAROSA CAVE.

There is shown in figure 139, an interesting specimen worked from a stick by scraping and finished by rubbing, a process of forming wood practiced by the Hopi who frequently accomplish the work by attrition with gritty stone alone. This is the head portion of a long roundel staff and is painted in lively colors of red, yellow, green, and black. (Cat. No. 4562, U.S.N.M., cave near Silver City, New Mexico. Length, 11 inches; diameter, $\frac{7}{8}$ inch.) A few examples of carving in wood from this region may be seen in figures 211 to 213. They are remarkable instances of work with stone tools.

FIG. 139.—ROUNDEL ROD FROM SILVER CITY, NEW MEXICO.

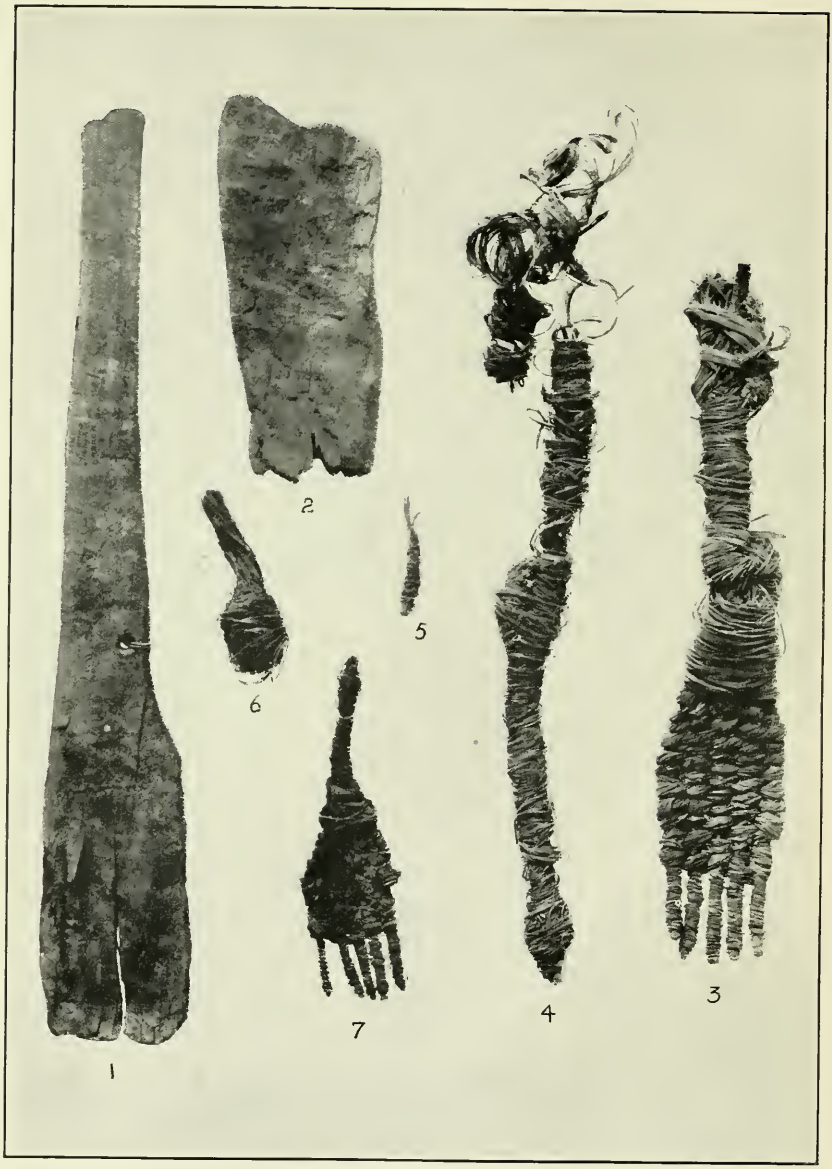
Tools of wood which explain some of the methods of wood working and which are also interesting as implements were found in greatest number in Tularosa cave. Examples of these are shown on plate 13; figure 1 is a digging stick, one end of which has been reduced in size by the removal of a sliver, sharpened by rubbing on a stone and polished by use. It is 20 inches long (Cat. No. 246456, U.S.N.M.); 2 is a short piece of split wood burnt at one end and probably used as a fire tender (Cat. No. 246458, U.S.N.M.); 3 is the end of a wooden implement very smoothly worn (Cat. No. 246458*a*, U.S.N.M.); 4 is a complete digging stick ground comparatively thin at the work-

[1] Two Summers' Work in Pueblo Ruins, 22d Ann. Rept. Bur. Amer. Ethnology, p. 182.




DIGGING STICKS AND FIRE-SHARPENED WOODEN IMPLEMENTS.

FOR EXPLANATION OF PLATE SEE PAGE 62.




WORKED WOOD AND BARK AND BASKETRY MANIKIN.

FOR EXPLANATION OF PLATE SEE PAGE 63

ing end, the knots and roughness of the branch being planed down by rubbing on a stone, as in other specimens; length, 28⅛ inches (Cat. No. 246456*a*, U.S.N.M.); 5, 6, and 7 are digging sticks worn down by use and subsequently employed as fire tenders or other temporary purposes. Plate 14 contains two pieces of wood working, one (fig. 1) a shovellike implement of bark and the other (fig. 2) a shell of wood from a cottonwood tree showing plainly the marks of a stone

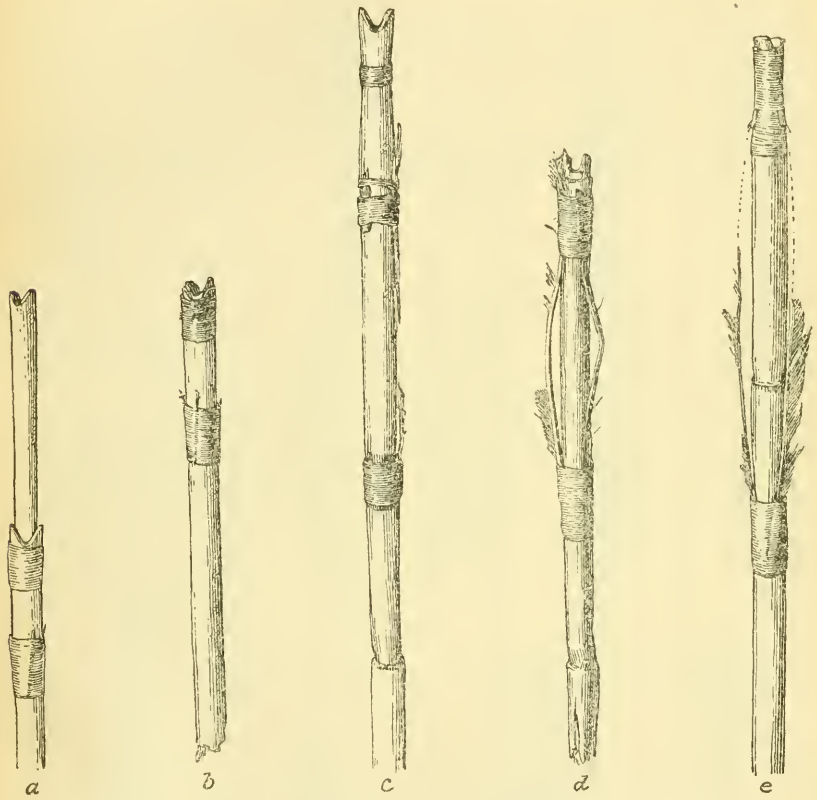



FIG. 140.—EXAMPLES OF ARROW CONSTRUCTION FROM BLUE RIVER.

excavating tool (Cat. Nos. 246199, 246205, U.S.N.M.), lower cave at Johnson's Blue River. The remaining figures are fragments of a basketry image found in the same cave. (Cat. No. 246195, U.S.N.M.)

### ARROW MAKING.

The shafts are of reed, whose only preparation was the smoothing of the joints by removal of slight inequalities on the leaf scar. The

weak reed tube offers very unstable material for the nock, and is liable to be torn by the recoil or pressure of the bow string. This was met by fitting a rod of even size in the tube (fig. 140 *a*, *b*), and the rod was held by the sinew lashing engaging one extremity of the feathering. Frequently an extra sinew winding was applied (fig. 140 *c*, *e*), which constricted the arrow and gave an excellent purchase for the fingers.

The feathering is usually applied near the nock end, as in *a*, *b*, and *d*, but sometimes removed further up the shaft as in *c*. The feather strips are not glued to the shaft, and appear to have been sprung or bowed in the specimens on which the feathering has survived. A number of arrows of the best workmanship show that the method of applying the feathering was first to bind the forward end of the strips under the sinew, proceed with the lower sinew wrapping for a short distance, then bind the lower end of the feathers in and continue the sinew to the nock. (Fig. 140 *e*.) The sinew was applied with great neatness and skill.

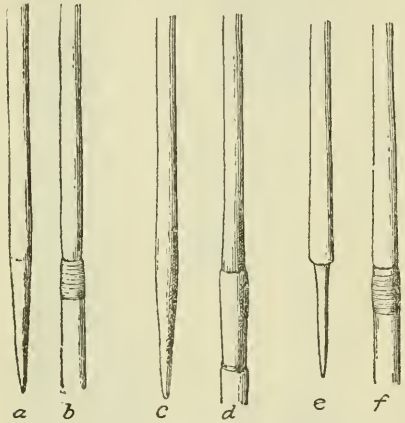



FIG. 141.—EXAMPLES OF FITTING ARROW FORESHAFTS FROM BLUE RIVER.

The foreshafts are of hardwood, finished with remarkable care and exactness, tapering gradually from the line of junction with the shaft to the point and tapering more abruptly to the lower end. Three types of insertion of the foreshaft are observed. In the first (fig. 141, *a*, *b*), it is not set so deeply, and the crown of the bulge occurs a little above the junction with the shaft, which therefore shows a slight constriction at this point. The sinew binding is applied close below the junction of the parts. In the second (fig. 141 *c*, *d*), the foreshaft is set deeply, and a slight swell is formed in the shaft. The sinew encircles the shaft some distance below the insertion of the foreshaft. In the third (fig. 141, *e*, *f*), the foreshaft is cut away, forming a collar, and the portion to be inserted in the shaft tapered to a rather slender spindle. The collar is gauged to the thickness of the walls of the reed, and when the parts are brought together the junction is perfect, and the caliber of the arrow shaft and foreshaft equal, the sinew wrapping altering it very little. This joinery is surprisingly neat, accurate, and strong, and passes the most rigid inspection. The work would excite admiration were the finest tools for its execution in the hands of the artisan; it is known,

however, that no tools worthy of the name were available to the aboriginal fletcher.

The setting of the arrowpoint was accomplished by fixing it with sinew in the notch cut at the end of the foreshaft (fig. 142 *a*, *b*), the

FIG. 142.—EXAMPLES OF SETTING ARROW POINTS FROM BLUE RIVER.

methods being commonly to throw a figure 8 lashing over the notches of the point (fig. 142, *c*, *d*, *e*, *g*, *h*, *i*, *j*) and sometimes to envelop the tangs in the sinew wrapping (fig. 142 *f*). In smooth edge triangular points (fig. 142 *j*) the lashing was thrown high on the sides to get a purchase for the sinew.

It is common to find in the cave débris the points retaining the sinew lashing, and the intention probably was for the arrowhead to stay in the wound. The foreshaft of many of the arrows offered in the caves were not nocked for the arrow point. In all other respects they are effective arrows, and they may have been used without the points for hunting (fig. 143 *a*). One specimen (fig. 143 *b*) has a barb which suggests that other plain foreshafts may have been thus equipped. There were found several bunt-head arrows (fig. 143 *c*), formed by tying bits of stick to the extremity.

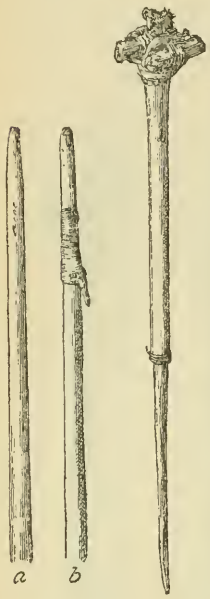



FIG. 143.—PLAIN, BUNT, AND BARBED ARROWS FROM BLUE RIVER.

The arrows from this region are all decorated on the foreshaft and under the feathering (fig. 144), and on the limited space to receive ornamentation the arrow maker applied designs showing noteworthy inventive skill. The foreshaft is usually covered with a flat tint of red ocher, but frequently the color is laid on in bands of varying width. Sometimes the sinew bands are colored red. The feathering area is painted with bright red and green and patterned with spirals, zigzags, lozenges, and other designs in black. Micaceous hematite, powdered and sprinkled on designs in the moist medium, formed a striking and pleasing decoration. Occasionally designs were burnt on the reed shaft. The specimens illustrating arrow making are from Bear Creek Cave and other sites on Blue River.

FIG. 144.—DECORATION OF ARROW FROM BLUE RIVER.

### FIRE-MAKING IMPLEMENTS.

Hearths and drills from various localities on Blue River and from one site at Spur Ranch are shown on plate 15. They are made of the flowering stalk of the yucca, and are identical, except in material, with those used at present by the Southwestern Indians. On the right of the plate is a large mass of decayed wood from the lower cave at Johnson's, Blue River, which was used as a slow-match. (Cat. No. 246200, U.S.N.M.)

### TEXTILES.

In point of usefulness the yucca and allied plants yield to no other vegetation of the region, and especially as primitive tying material their value was very great. These plants satisfied the equation on

FIRE-MAKING APPARATUS AND SLOW WOOD.

FOR EXPLANATION OF PLATE SEE PAGE 66.

the textile side of civilization, being adequate to all uses from the strip of natural leaf, through cord, to finished fabrics.[1]

KNOTS IN YUCCA STRIPS.

Innumerable knots tied in strips of yucca and cord were found in the Tularosa and Bear Creek caves. They are simple, and no examples show particular inventiveness in the joining of materials, except the ends of the carrying bands. The overhand knot (fig. 145 *a*) is common; a knot for securing a strip around a stick consists of the ordinary knot formed by two half hitches. (fig. 145 *b*.) The square knot shown in obverse and reverse (fig. 145, *c*, *d*) was often used, and was effective in the yucca leaf, which has a tendency to shear unless the parenchyma is worked out of the fiber. A similar knot is shown at *e*, *f* (fig. 145). The pack cord knots are very interesting and ingenious and likewise of extraordinary strength (fig. 145 *g*, *h*). They were formed by taking two leaves of yucca, laying them butt to point one over the other, bending up the end of one and securing it with a tie. A wooden toggle was placed in the bend, the leaves pierced above the peg and strong cords rove through and around the sections, the method being to loop the cord over the standing part above the peg, bring the ends around the sides and draw them

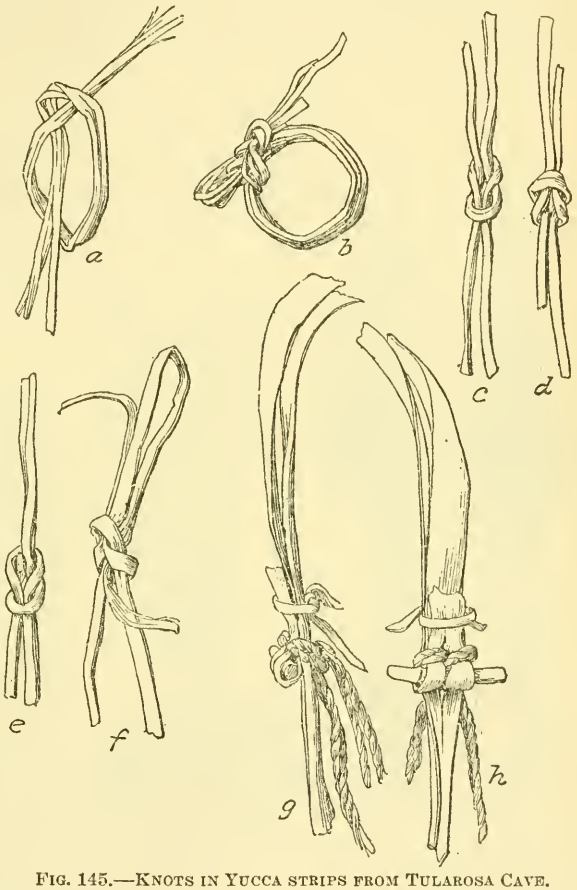



FIG. 145.—KNOTS IN YUCCA STRIPS FROM TULAROSA CAVE.

[1] The Palm and Agave as Culture Plants. Compte Rendu du Congrès International des Américanistes, XV Sess., Quebec, 1906, vol. 1, p. 215–221.

through the hole, one cord above and one below the horizontal part of the loop. (Fig. 145 *g*, *h*, side and back view.) An exceptionally strong lashing of this sort (fig. 146 *a*, *b*) is made with braided cord, the under leaf is braided at the end, and the thong is wound about the cord. Another lashing is made with a hank of untwisted fiber secured to a yucca leaf bent over the toggle. (Fig. 146 *c*.) The specimens indicate that heavy back loads were carried in a carrying frame, no examples of which have survived, but a model placed in the Bear Creek Cave shrine (see fig. 318) may be of the form used on the Tularosa. On the other hand, the pack may have been merely secured with cord or smaller burdens held fixed in a pouch construction made by tying yucca strips in a manner resembling network, specimens of which were found both on the Tularosa and Blue Rivers. True network, however, appears not to have been known by the peoples of this region.

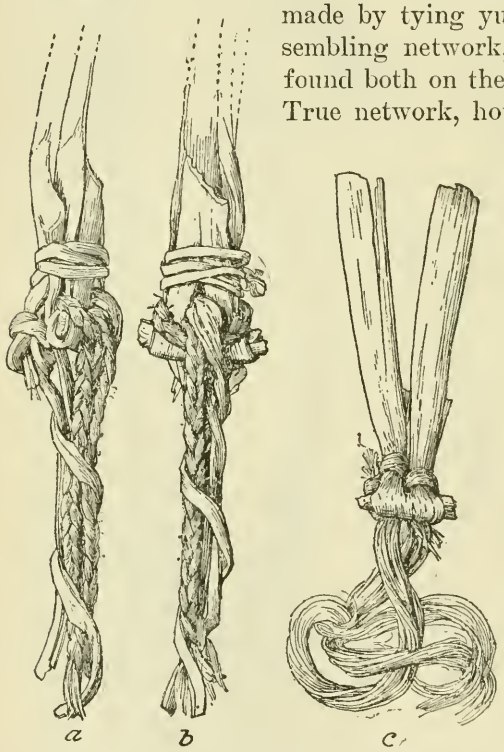



FIG. 146.—LASHINGS OF YUCCA STRIPS FROM TULAROSA CAVE.

CORD.

The surprising variety of cord found in the débris of this cave gives an idea of the comprehensive value that this first element of the textile industry had to the ancients of the Tularosa. The commonest kind of cord here is a thick, very linty, two-strand, not hard-twisted cord, which appears to be of shredded yucca fiber. It is generally of natural color, but is sometimes rubbed red with ocher, and was used almost exclusively for the application of feathers (see fig. 148), the cords so overlaid being combined to form garments, etc., resembling the twisted fur strip blankets of the Pueblos, Utes, Californian, and other Indians.

A second variety is a very strong, clean cord made from yucca, dasylirion, and like long, wiry fiber, which now has aged to yellow brown and dark brown. It was twisted by hand and used for bowstrings and for purposes where very strong cord was needed. It is sometimes thick like small rope and is two-ply, three-ply, two-ply laid up, braided and sometimes two braids laid up to form cord. Cord of this character was most useful.

Bark cord, apparently of walnut or natural bark, dyed, was made and had a limited use as a bundle to be placed beneath the baby in the cradle.

Cotton cord found here is coarse and of natural color or rubbed with red ocher. Cotton cords were sometimes formed into a braid at the corner of some textiles. Its common use was for loin bundles. (See fig. 158.) A few specimens of sinew cord were found, one well laid up with a loop ingeniously formed at the end. Cord made from human and other hair is comparatively rare.

### CORD-MAKING SERIES AND PRODUCTS.

Raw material for fiber was furnished by several species of yucca, several of dasylirion, and one or more of agave. These plants are abundant, and no doubt the supply available for the aboriginal cord wainer was far above his needs; and that the extracted fiber was not regarded as of much value is shown by the amount of it in various stages of elaboration thrown away into the back of the cave. In most cases it is not possible to ascertain by the eye the particular plant from which a given mass of fiber was derived, but as most of the natural leaves and leaves in the first stages of fiber extraction are of yucca, it is presumed that this plant was the chief source of supply; and also, it produces a very good fiber in greater amount than the other plants mentioned. Yucca leaves (fig. 147 *a*) and the central spike of closely wrapped pale leaves were common in the débris, and with them leaves which had been coarsely shredded by pounding with a stone. (Fig. 147 *b*.) A "quid" (opened out for purposes of drawing) containing the entire mass of fiber in one leaf, the spine end of which has not been reduced to fiber, is shown at *c*. These "quids," which are flattened masses of roughly circular outline, found in great numbers in the rubbish of dry-rock shelters formerly inhabited or connected with the houses of the ancient Pueblos appear to have been formed by chewing, but there is some doubt on this point, as the chewing of the dense acrid leaf would seem to require good teeth and a powerful resolution. It is probable that the leaves were boiled, pounded in a small mortar, and dried, when the parenchyma would easily fall away in small fragments and dust on rubbing the fiber between the palms. The Zuñi, Mrs. M. C. Stevenson informs me, boil the yucca leaf to extract the fiber. A specimen of the cleaned, straightened fiber and a small hank twisted up for future use are shown at *d* and *e*. Two-strand (fig. 147 *f* and *g*); two-strand, two-ply (fig. 147 *h*); three-strand (fig. 147 *i*); and four-strand (fig. 147 *j*) combine the varieties of yucca fiber cord observed, except a few braided specimens (fig. 147), the

smoother, long fiber cords, which were twisted by hand, being employed for bowstrings. Much of the cord was spun from finely shredded yucca fiber by means of the spindle with a disk whorl like those used by the Pueblos, the treatment in this case being similar to that employed with cotton or other short fiber. Spindle whorls,

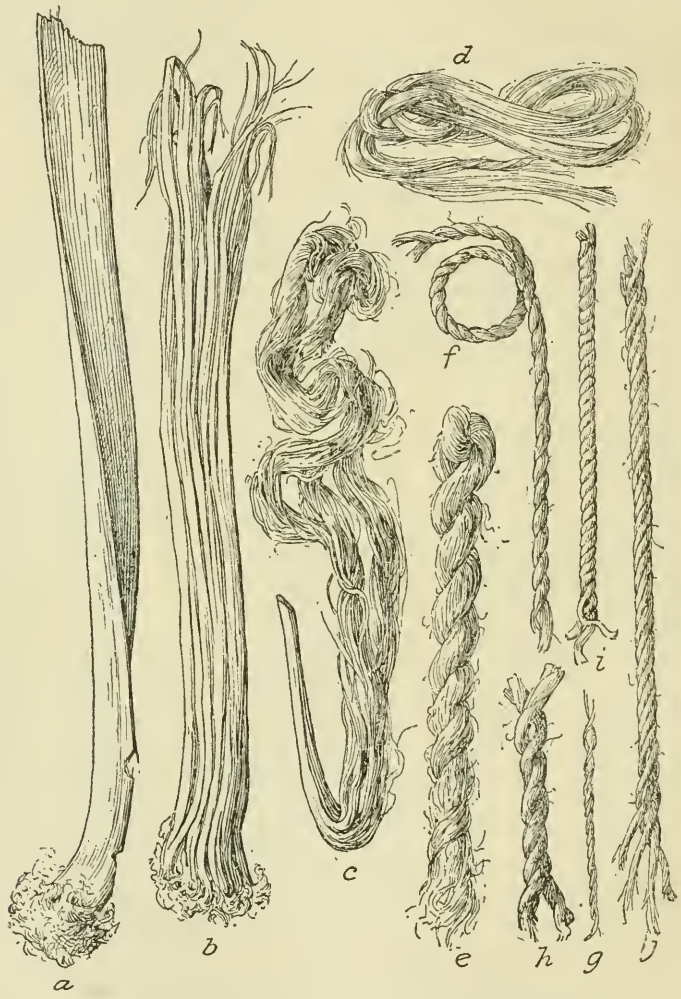



FIG. 147.—CORD-MAKING SERIES FROM TULAROSA CAVE.

while not common, have been recovered from the open-air ruins and caves in this locality. Cotton and bark cord is of common occurrence in the Tularosa and Bear Creek caves, but no data survive which allow us to reconstruct the series of steps used in their manufacture. A few fragments of sinew cord were recovered.

From the frequent occurrence of fragments of feathered cord in the Tularosa Cave débris, one may judge that its use was quite common; only one whole garment, however, was recovered. (See fig. 149.) The process of feathering cord was to strip the downy piles of the turkey (fig. 148 *a*, Cat. No. 246649 U.S.N.M.), and wind them spirally around a cord of fiber (fig. 148 *c;* at *b* is shown the strip unwound), crossing the larger end under the first one or two winds and securing the smaller end under the beginning of the next winding. The finished cord is shown in figure 148 *d*. Strips of fur were wound in the same manner. (Fig. 148 *e*.) In some cases pairs of strips of fur were twisted together, forming a cord, and these cords joined by twining, as in the feathered cord; again, one strip of fur was twisted on itself, making a neat cord.

FIG. 148.—FEATHER CORD MAKING FROM TULAROSA CAVE.

In using very fine down or very soft hair the method was to twist it between two-cord strands whose grip would hold the material firmly. Bits of tender skin of mice, etc., were also twisted up with the strands and laid up into cord. Skin strong enough was twisted spirally, forming an element like a cord, which was made into a fabric by twining. These interesting devices by which fur can be worked like cords admits of the skins of small mammals becoming in effect one skin, but more flexible and perhaps warmer than a bear or a buffalo skin.

Cords of fur and of feathers were used to form clothing, blankets, pouches, ornaments for parts of costumes, for necklaces, and probably for waist ornaments.

A jacket, Cat. No. 246430, U.S.N.M. (fig. 149), was taken from a mummied body, which was recovered at a depth of 7 feet in the débris of the Tularosa Cave. It is made up of thick feathered cord (fig. 149 *a*) twined together in the same fashion as the rabbit skin or feather robes of the Pueblos, Utes, California tribes, and other Indians of the West. The texture of the garment is practically formed of one cord passed to and fro side by side until a wide band of proper length to girt the body was formed, and the twining string, which is in some cases dark blue, inclosed the upper series of loops, which

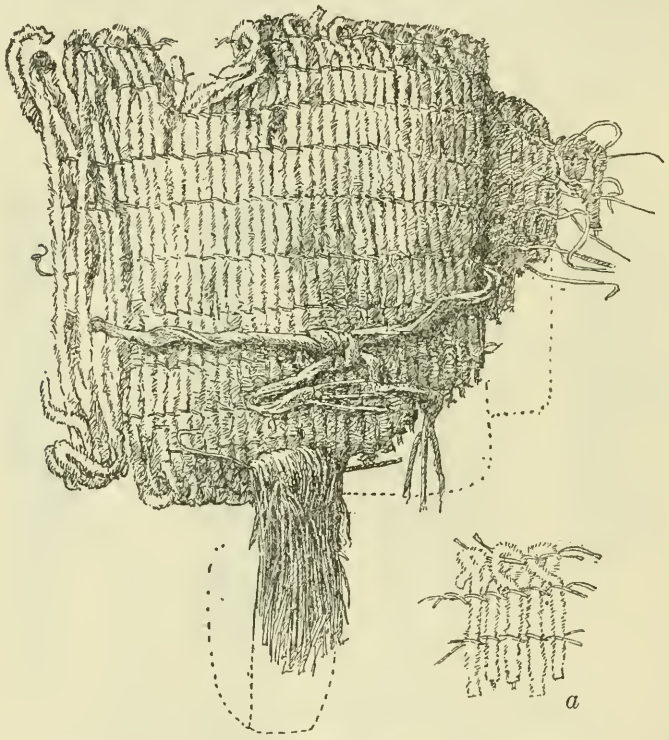



FIG. 149.—FEATHER JACKET FROM TULAROSA CAVE.

were twined flatwise, forming an ornamental border. A belt of dog's hair (see fig. 150) held the jacket in place, and a loin band consisting of a hank of cords dyed pink with juice of some fruit passes between the limbs and is supported on a cord which goes through the loop end and around the waist. The method of wearing the garment is shown in this figure. The jacket reminds one of the rod-armor jackets which were used extensively among the American Indians, and possibly the idea of protection against arrow wounds, as well as the requirements of personal comfort may have been connected with its use. It is a matter of great interest and importance to be able

to recover from oblivion the vestiture of an ancient Pueblo tribe, especially since in the vast majority of instances no relics of this character have been preserved.

### WEAVING TOOLS.

No weaving tools or devices have been recovered from the caves explored, which leaves the method of weaving to conjecture; but there is no reason to believe that the art was other than in a primitive stage as to tools and mechanical aids, thus depending entirely on skill of hands, as in the simple weaving apparatus of the Chilkat Indians of Canada. The heddle, which admits of throwing a shed and simplifies and expedites weaving, seems to have been unknown in North America prior to its introduction among the Pueblos through the Spaniards, but was known in Mexico and in the cultured countries of Central and South America. The Navaho received their heddle from the Pueblos, and to this day do not make full use of it, but raise groups of warp threads by means of the sword-batten, and never on any occasion throw the shuttle the whole breadth of the warp, even when stripes are being woven. The complete heddle lifts are known only to the Pueblo Indians.

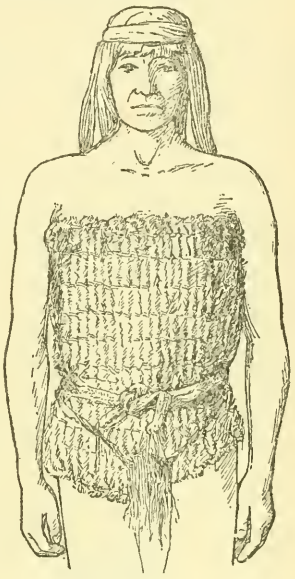


FIG. 150.—METHOD OF WEARING CORD JACKET, BELT, AND LOIN CORDS FROM TULAROSA CAVE.

Spindle whorls, consisting of a flat disk worked from thin layers of stone or from fragments of baked pottery, are the type found in the northern part of the Pueblo region, and the ancient whorls differ in no respect from the modern Pueblo specimens except that the latter are made of hardwood and horn, and only occasionally does one of stone occur. In the portion of the Pueblo region nearest Mexico are found lenticular whorls of pottery deeper below a median horizontal line, like the body of a top, and nearest in form to the ancient whorls of Mexico.

FIG. 151.—SPINDLE WHORL FROM CAMP VERDE.

One of these lentiform whorls was found in the cavate lodges near Camp Verde, Arizona, by Victor Mindeleff. It is of coarse brown ware, but the upper surface is somewhat smoothed. The hole for the spindle is $\frac{1}{4}$ inch in diameter. The whorl measures $1\frac{1}{2}$ inches in diameter and $\frac{3}{4}$ inch thick. (Fig. 151.)

Another from adobe ruins, 4½ miles east of Phoenix, Arizona, collected by Dr. Edward Palmer, is of light-brown pottery having a smooth surface. It is 1⅜ inches in diameter and ⅞ inch thick, the spindle hole ⅛ inch in diameter. (Cat. No. 98007, U.S.N.M., fig. 152.)

FIG. 152.—SPINDLE WHORL FROM NEAR PHOENIX, ARIZONA.

The specimens found with the whorl consist of shell ornaments and a hardwood paddle-shaped implement.

A crude large spindle whorl of light yellow tuff 2½ inches thick, pierced with a hole ⅜ inch in diameter, was found by J. H. Carlton in the Pueblo Viejo Valley, Upper Gila River, Graham County, Arizona. (Cat. No. 98633, U.S.N.M., fig. 153.)

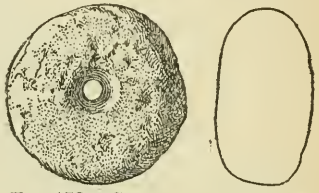


FIG. 153.—SPINDLE WHORL FROM PUEBLO VIEJO VALLEY, UPPER GILA.

Pottery spindle whorls are also found in the region south of the headwaters of the Gila, one in the Museum coming from Solomonsville, Graham County, Arizona, collected by Dr. J. Walter Fewkes (Cat. No. 177552, U.S.N.M., fig. 154), 1¼ inches in diameter, hole $\frac{5}{16}$ inch. They are usually smaller than like whorls from the North, indicating the spinning of finer thread.

Fine thread was produced by the spinners of this region and specimens are of somewhat frequent occurrence. It was made up in hanks and undyed. One of these hanks was found by Charles Solomon on Bonita Creek, near Solomonsville, Arizona. It was laid over in strands 26 inches to the turn; the yarn is about the number of small cotton parcel cord. Much of the yarn owes its preservation to charring in the house ruins, and we are thus enabled to say that thread of the fineness of No. 12 cotton was made.

FIG. 154.—SPINDLE WHORL FROM SOLOMONSVILLE, ARIZONA.

Specimens of six-strand cord of yucca fiber over which are wound two cords of different color, the method being to serve each color alternately, passing the cord not needed underneath, were found in Bear Creek Cave. (Fig. 155, *a*, *b*.) The result imitates a strand of beads, which was evidently the idea in the mind of the man who placed the cord around a large reed cigarette as an offering.

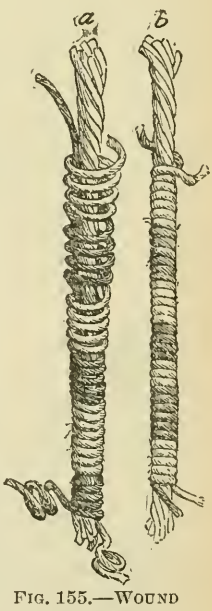



FIG. 155.—WOUND CORD FROM BEAR CREEK CAVE.

A ball of yucca fiber cord (fig. 156, method of wrapping shown at *a*), formed by carefully winding the cord on a cylindrical object,

was collected at Bear Creek Cave. The ball appears to have been dipped in some viscid substance at the time it was made, in order to hold it in shape. The ball may have been wound on a prayer-stick, or rounded rod, or on the extremity of a bow to hold the string in place as observed on the nockless bows of the East Indies and Africa. The orifice in the ball is slightly unsymmetrical and accords with the section of the simple pointed bows of this region.

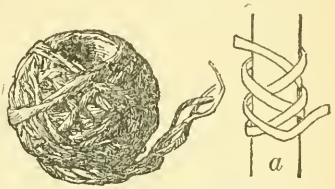



FIG. 156.—BALL OR COPP OF YUCCA CORD FROM BEAR CREEK CAVE.

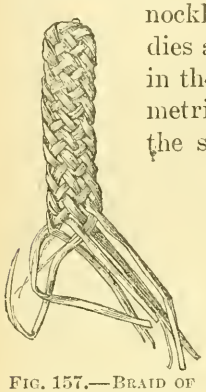


FIG. 157.—BRAID OF YUCCA FROM EAGLE CREEK.

BRAIDING.

A primitive textile in the form of a braid of yucca was found in a cave on Eagle Creek north of Morenci, Arizona, near White Mountain Apache Reserve line by Bryan D. Horton. (Cat. No. 2151, U.S.N.M.) It is neatly braided from six strips of yucca leaf (fig. 157) and was evidently thrown away before completion. It was probably intended to form a portion of the carrying band. Braiding in all varieties was known by the inhabitants of this region.

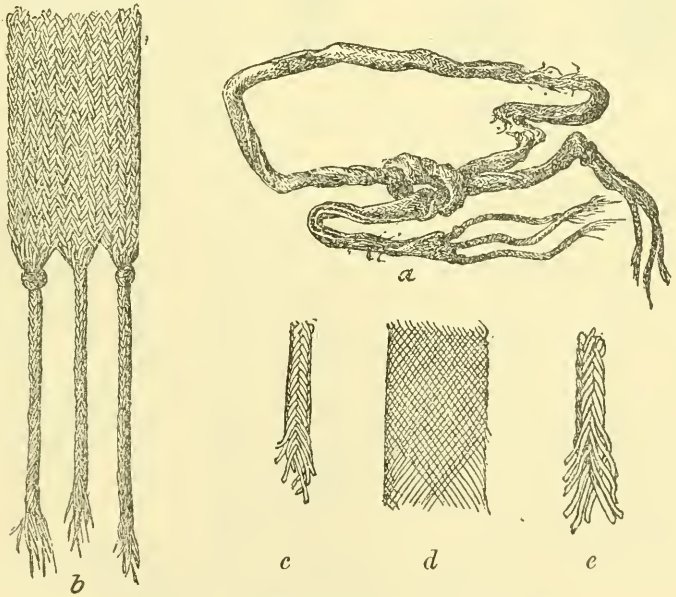



FIG. 158.—BRAIDED SASH FROM TULAROSA CAVE.

A sash (Cat. No. 246430, U.S.N.M.) girded the loins of a mummy buried in the débris of the Tularosa Cave and held the jacket of feather cords to the body. (Figs. 149, 150.) The material is well-

spun cord of white dog hair worked in a flat braid of 26 strands, the ends divided into three masses and braided round, the outside bundles knotted just above the commencement of the round braiding. (Fig. 158, (*a*) entire belt, (*b*) detail of end, (*c*) 10-strand cord, (*d*) braid of 18 strands, (*e*) 8-strand cord.)

An ornamental fringe was collected in Bear Creek Cave, Blue River, Arizona. It consists of a square braid cord of 8 strands (fig. 159 *a*), over which is slipped a ring formed by winding cord around a core of fiber. (Fig. 159 *b*, *c*.) The ring is allowed some play, but is prevented from slipping back on the square braid by binding with fiber the two loose ends of the wrapping cord. The strands of the braid are formed into a ball at the end after the ring is slipped on. (Fig. 159 *d*.) A number of these finely made objects were found in a shrine, but they had been burnt away from their attachment. They probably formed the fringe of a sacred sash like those of the Zuñi and Hopi which have a fringe of almost identical construction but much coarser than the specimen described.

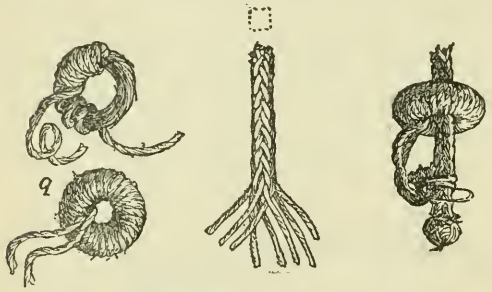


FIG. 159.—BRAIDED FRINGE FROM BEAR CREEK CAVE.

### WOVEN TEXTILES.

The fragmentary remains of ancient ornamented textiles which occasionally come to light give an idea of the quality of the fabrics that have perished. One mantle of superb color and design found in a Grand Gulch cliff dwelling of the Mesa Verde and belonging to the American Museum of Natural History of New York shows the great taste and skill of the ancient dyers and weavers. The Zuñi in 1540 had weavings that excited the admiration of Europeans. Witness the consignment by Coronado of various articles to Mendoza, one of which is a garment of such remarkable workmanship that he takes pains to impress upon his patron that it was not made with a needle.[1] It appears probable that the garment was of the fine fabric decorated with openwork pattern of which only fragments have been figured in this monograph, found by Dr. J. Walter Fewkes in Casa Grande, where it was preserved by charring. (See fig. 163.)

A. F. Bandelier first called attention to this remarkable textile and described it as drawnwork. The fabric is of such a character as to impress those who have found it with a feeling of surprise at its technic and quality of ornamentation, which would seem to be beyond

[1] The Coronado Expedition. 14th Ann. Rept. Bur. Ethnol., Pt. 1, p. 562.

the ability of the ancient tribes, so far as their culture is declared by the relics recovered from the ruins.

This weaving, however, is very simple and is not more difficult than basket work, neither did it require instrumental aid beyond a rude frame. The weaving is like the early Italian *buratto* work.

Scattered throughout the débris of the Bear Creek Cave small squares of cloth with a circular opening in the center, apparently finished in buttonhole stitch, were somewhat frequently encountered, but only one fragment of this cloth from which the squares mentioned had not broken away was found. (Fig. 160, Cat. No. 246123 *a*, U.S.N.M.) This fragment resembles that shown in figure 161 (Cat. No. 246123 *b*, U.S.N.M.), but the openings are worked with 12 instead of 6 threads (fig. 160 *b*), and the winding is tighter on the roundels (fig. 160 *c*). The attachment of the warp threads to the edging cords is shown at *a* (fig. 160), and a scheme of the pattern at *d*. It appears that this variety of openwork cloth was more common with the devotees of the Bear Creek shrine than other textiles. The cloth was perishable, however, because it was closely woven, giving it a tendency to crack and disintegrate from age.

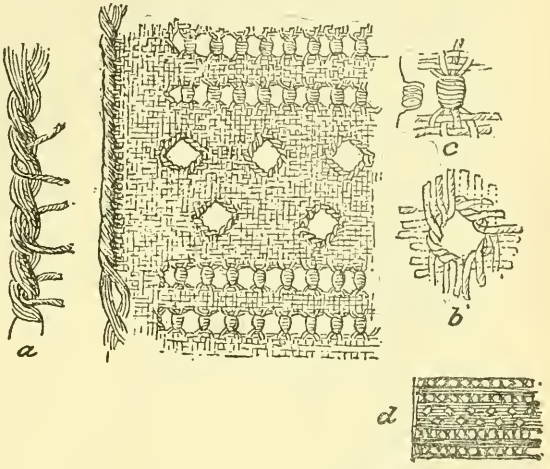



FIG. 160.—ORNAMENTED CLOTH FROM BEAR CREEK CAVE.

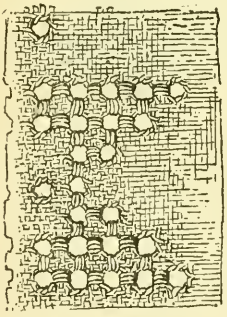


FIG. 161.—ORNAMENTED CLOTH FROM BEAR CREEK CAVE.

In a weaving of cotton cord (Cat. No. 246123*b*, U.S.N.M., fig. 161, Bear Creek Cave) the pattern consists of a series of circular openings formed by the same methods employed in the fabric described under 126123 *a*, Cat. No. U.S.N.M. The fragment shows also a modification of the design made up of triangles, probably a double symbol of birds. (See squares on serpent effigy vase, p. 46.)

A fragment of texture of small white cotton thread in plain weaving (Cat. No. 246123*c*, U.S.N.M., Bear Creek Cave) has an ornamentation consisting of a row of openings formed by gathering 4

warp threads and winding the fourth thread around the other three, bringing it down into its proper place in the warp below (fig. 162 *b*, with diagram of spiral). After an interval of plain weaving there begins a design made up of a frame of superimposed triangles surrounding a square cross. (Fig. 162 *a*.) The vertical constructions of the warp in this pattern are formed as described above, the horizontal as in figure 162 *c*, where the lower member of the quartet of cords is wound spirally around the other three, returning again to place. The openings in the cross are woven as in figure 162 *d*, where two pairs of cords are given a twist.

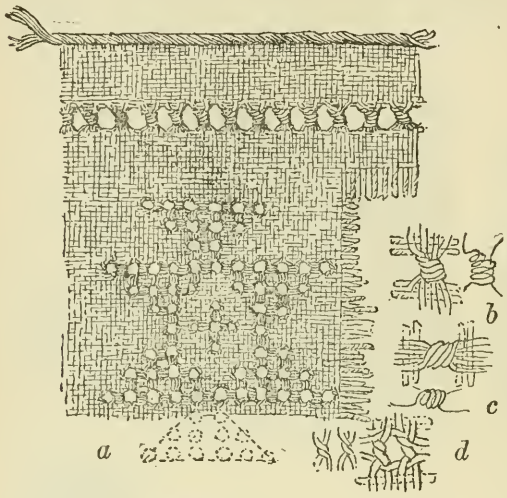



FIG. 162.—ORNAMENTED CLOTH FROM BEAR CREEK CAVE.

It appears from this work that the threads which may be termed the "warp" are either hung free from the loom beam, as in the

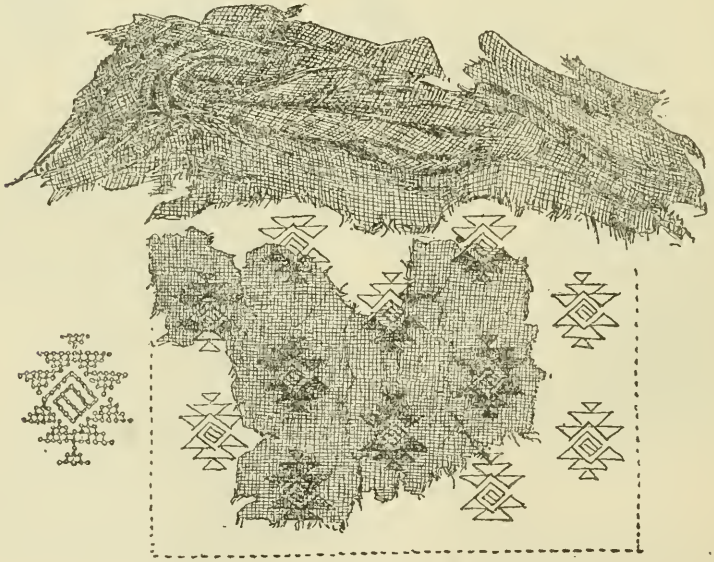


FIG. 163.—ORNAMENTED CLOTH FROM CASA GRANDE.

Chilkat method, or if stretched the individual cords were detached from the lower beam, used, and secured again.

The largest fragment of ancient ornamented cloth was found by Dr. J. Walter Fewkes in the ruins of Casa Grande (Cat. No. 252105,

U.S.N.M.) (fig. 163), and the specimen owes its preservation to the fact that it was carbonized. With the ornamented cloth was found a large piece of plain fabric, not so fine in texture, of which the former

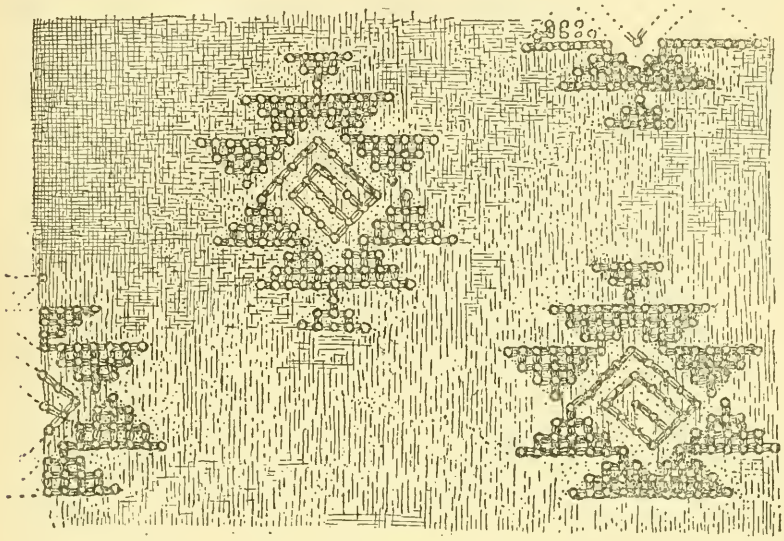


FIG. 164.—DETAIL OF PATTERN OF ORNAMENTED CLOTH FROM CASA GRANDE.

was probably the border, but it is scarcely possible to say what the original garment was when it was entire, though one may conjecture that it was a *huipil*. This important relic, which is shown in figure 163, is very fragile, but it preserves evidence of esthetic taste in the use of beautiful symbols, shows skill in weaving, and perhaps connects the finer fabrics of ancient Mexico with the southern portion of the Pueblo region. It will be seen (fig. 164) that the detail of weaving is like that of the Bear Creek specimens. The central field of the pattern unit, which is evidently the familiar interlocking fret identical with the same motive expressed in curves instead of straight lines, is overlaid with threads, giving the fret a slight relief.

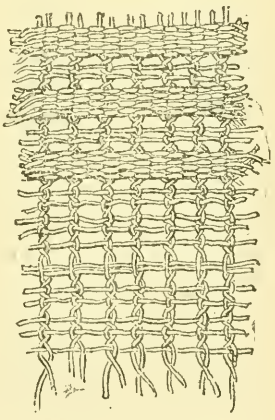


FIG. 165.—ORNAMENTED CLOTH FROM BEAR CREEK CAVE.

Another example of weaving is seen in figure 165 (Cat. No. 232152 *a*, U.S.N.M., Bear Creek Cave), which shows at *a* the introduction of two-weft threads, probably marking the middle of this band of openwork. The fragment is of brown thread somewhat coarser than is usual in these fabrics, and appears to be of cotton dyed with a vegetal substance.

Cat. No. 252153, U.S.N.M., is a fragment of openwork cloth from Bear Creek Cave, Blue River, Arizona. The work starts with a band of plain weaving and at intervals (fig. 166 *a*) alternate warp threads, enough to leave three or more spaces, go back to the edge. Across the warp threads pairs of weft threads are carried as in twined weaving, leaving rectangular spaces. (Fig. 166.) The warp is secured to two intertwisted cords which form a round edge. The fragment shows an interesting diversity of pattern produced by the simple means employed in its manufacture.

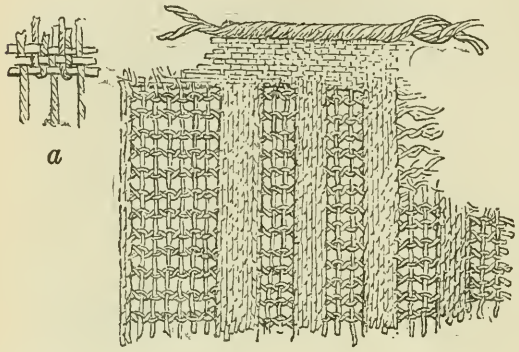



FIG. 166.—ORNAMENTED CLOTH FROM BEAR CREEK CAVE.

A complete square of this cloth has been examined by the writer since the completion of this report. It is the property of Miss Mary Tuttle, of Clifton, Arizona, and was found in a cave near Solomonsville, Arizona. The specimen is an apron and measures 5¼ by 6 inches.

There is shown in figure 167 (Cat. No. 262721, U.S.N.M.) a joint of reed filled with herbs, thousands of which are found, but rarely encircled with a woven cincture as in this example. The cincture consists of a carefully woven band of white cotton, having at the ends three cords for wrapping the band securely around the cane. This cincture stands for the girdle worn by those who offered the cigarette and may point to the character of this portion of the costume of the ancient inhabitants of this region. The specimen was collected from a cave near Phoenix, Arizona, by F. E. Cooley.

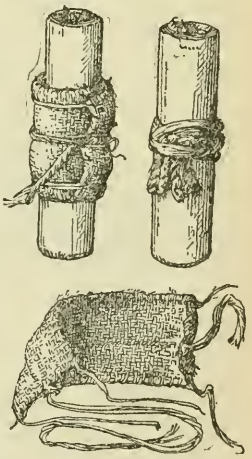


FIG. 167.—SACRED CIGARETTE WITH WOVEN SASH FROM PHOENIX.

A remarkable specimen consisting of a woven band, *a*, figure 168 (Cat. No. 156276, U.S.N.M.) was found in a cave in the Red Rock country south of Flagstaff, Arizona, by Dr. J. Walter Fewkes. The ground work is plain weaving, and by the handling of the weft threads, as in *b* (fig. 168), openings of various lengths are left, producing the pattern. The warp, which is of coarse cord, was stretched between two rods, as in *c* (fig. 168), and the weft worked in with the

fingers, the resultant fabric resembling basketry. A number of the middle loops at the ends were woven over to form a strong loop for the attachment of cords to the band. The pattern, which is shown entire in the chief figure and in detail in figure 169, is of the highest order of design and taste. It resembles the patterns pressed in the ridges of clay on the coiled pottery (fig. 2, pl. 7) of the region of Gila culture. The specimen appears to be a forehead band and may have been attached to a cradle.

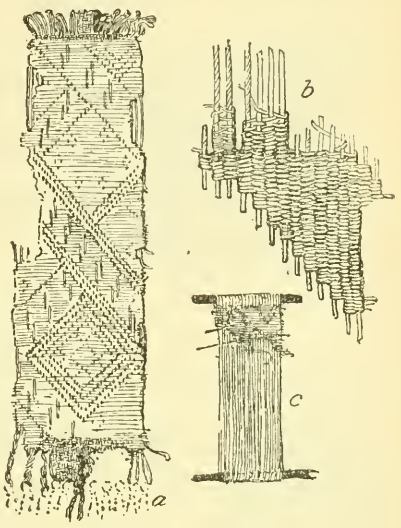



FIG. 168.—ORNAMENTED WOVEN BAND FROM RED ROCK.

Another curious woven fabric (fig. 170) from a cave in the Red Rock country, Arizona, was collected by Dr. J. Walker Fewkes. (Cat. No. 156275, U.S.N.M.) The fabric is represented by a fragment of probably a loin cloth or sandal and is composed of a weft of bundled cords or strips of native cloth interwoven with cord, and the

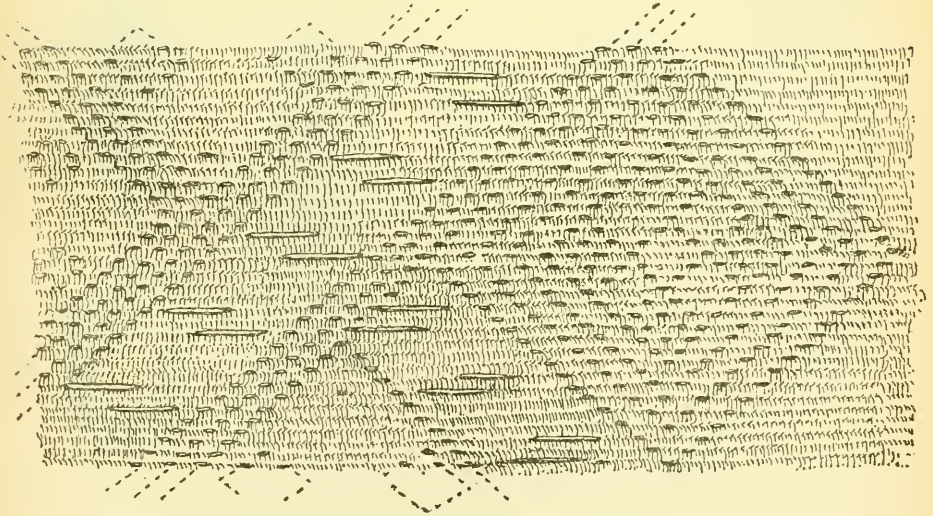


FIG. 169.—PATTERN OF WOVEN BAND FROM RED ROCK.

cloth is in effect rag carpet. This type of weaving is very rare, and, so far as observed, confined to this locality. It has, how-

ever, a relationship to the fur and feather cord textile and to coiled basketry.

A remarkable band of textile (fig. 171) was found wrapped around a paho offered in a shrine at Bear Creek Cave. (Cat. No. 246020, U.S.N.M.) It consists of a series of graduated loops in four sets of three each, knotted in a continuous cord and a similar series of uniform loops worked into the bases of the first series. The graduated loops run from right to left alternately, making triangular areas and and the even loops border two sides of the triangles, running thus zigzag across the band. A binding cord is run along the margin and knotted into the fabric at the apex of the triangles. The beginning loops are shown at *a* gathered on a cord which forms the end of the band; the second series of loops is shown at *b;* the knot is shown in front at *c;* in reverse at *d* and opened at *e;* a portion of the band in detail is shown at *f;* the edge cord at *g*, *h;* the band unwrapped from the paho at *i;* and the specimen as found at *j*. The cords are yellow and dark brown in color.

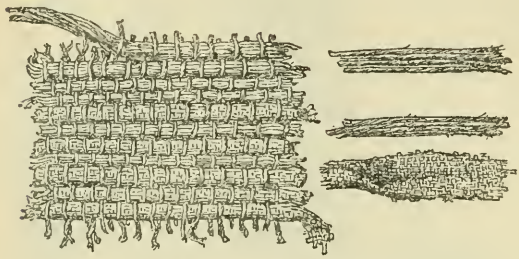


FIG. 170.—WOVEN FABRIC BAND FROM RED ROCK.

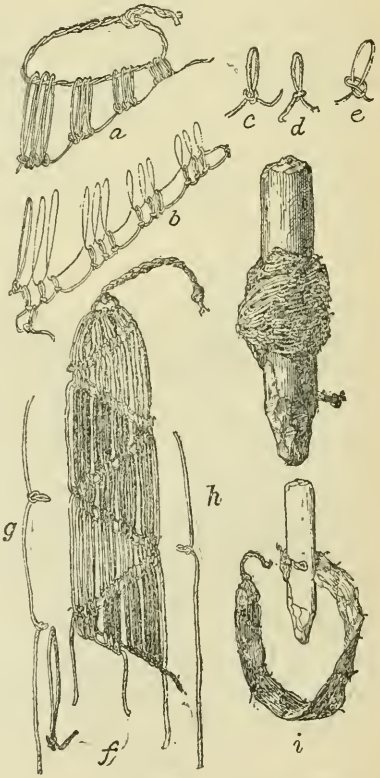



FIG. 171.—KNOT-WORK BAND FROM BEAR CREEK CAVE.

Length of stick, 5 inches; diameter, $\frac{7}{8}$ inch; width of band, $1\frac{1}{2}$ inches.

Cloth from the Tularosa cave is of several varieties, the commonest being a coarse brown fiber textile resembling burlap made of shredded yucca fiber or willow bark. It is found in connection with sandals and was worn as insole and wrap-stocking. Some pieces of this cloth are woven of rather well-dressed cord and, though coarse,

are of comparatively even texture. Coarse cotton of brown and earth color is found in the form of strips in the débris, and was used apparently for tying on parts of the costume. Sometimes the cotton is dyed dark brown. Only one fragment showing an attempt at textile ornament was observed, and that simply by alternating dark brown with natural color threads.

### DYES ON CORDS.

A very interesting feature of the collection of textiles is the evidence of the use of dyes and other methods of coloring cord and cloth. The study of the technology of the specimens was carried out by Wirt Tassin of the National Museum, and his results may be summarized as follows:

The materials are vegetal fiber in the main, with one or two specimens containing buffalo and mountain goat hair. The colors were applied by the crude method of rubbing in ochers and earths practiced by many of the present Indian tribes; by dipping the yarn or cloth in a vegetal colored solution, technically known as a vat color; in some cases the fiber shows a mordanted color, the fixing substance not known, except in some specimens mordanted with iron tannate. It is not improbable that cord may have been blackened with iron tannate by burial in mud, an art applied to basket materials among many tribes. The colors represented are reds, browns, blue, and purple, a greater variety and better dyes occurring in the specimens from Bear Creek Cave. The blue shades vary from dark to light, one specimen (Cat. No. 246045, U.S.N.M., Bear Creek) tested reacting for indigo, probably of the *Indigofera anil* common in Mexico. The purple occurring on a loin cord bunch from a mummy in the Tularosa Cave resembles a color produced by rubbing the cords with the juice of prickly-pear fruit.

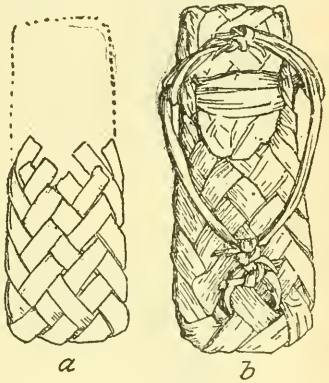



FIG. 172.—SANDAL FROM TULAROSA CAVE.

### SANDALS.

A variety of sandals was found in Tularosa Cave, New Mexico. The simplest of these is made of yucca leaf strips, four in number, bent in half, forming eight elements, and braided. (Fig. 172 *a*, Cat. No. 246762, U.S.N.M.) The braid is made longer than the foot, the surplus being turned back, forming a reenforcement for the heel, and this flap is held in place by the loop going over the instep. This loop is formed by a strip slipped under a braid strip on either side of the

sandal, is knotted to the toe loop, and to it is attached also the heel support. (Fig. 172 *b*.) This style of sandal was most numerous in the cave débris.

The material employed in making a sandal from Tularosa Cave, New Mexico, is yucca leaf torn into wide strips and laced over a coarse, twisted cord of the same leaf. (Fig. 173 *b*, Cat. No. 246688, U.S.N.M.) At the narrower or heel portion the strip seems to pass

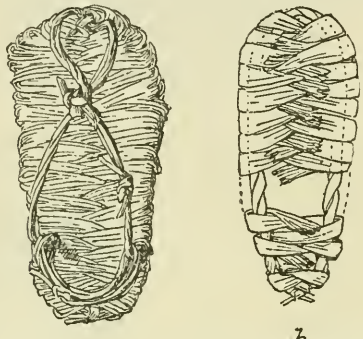



FIG. 173.—SANDAL FROM TULAROSA CAVE.

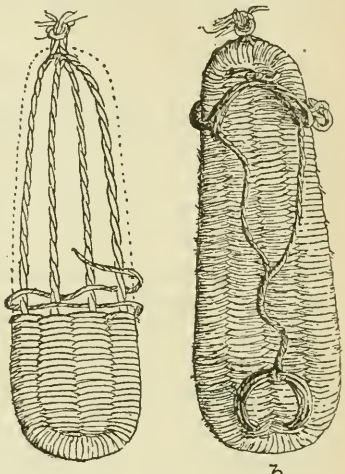



FIG. 174.—SANDAL FROM TULAROSA CAVE.

over and back several times; in the broader portion the strips pass over once and the ends stick out below alternately. The upper side (fig. 173 *a*) is furnished with the cord which held the sandal to the foot. This cord is fastened to the cord woven into the sandal near the heel and at the toe, forming a figure 8. The heel support is separate and is looped around the standing part of the cord.

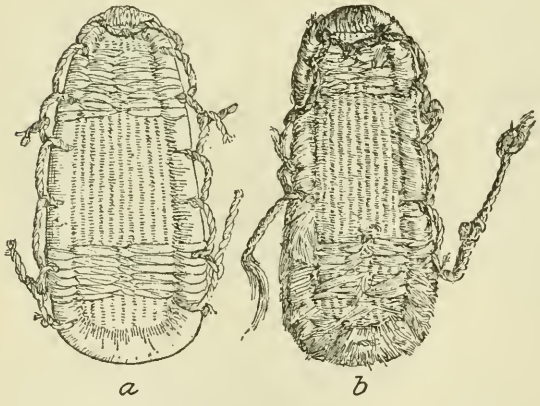



FIG. 175.—SANDAL FROM TULAROSA CAVE.

Woven sandals were made of well-finished yucca-fiber cord, the method being to prepare a four-strand weft by bending two cords and securing the ends, and on the weft the cord woof was woven as in *a* (fig. 174, Cat. No. 246702, U.S.N.M.). The bunched ends of the weft projected as a trail, a feature that is familiar in the leather moccasin. The neatness of the finish of the sandal (fig. 174 *b*) and the evidence of taste in its outlines speak well of the art of the sandal maker. The style of sandal shown was worn by women.

Another variety of woven sandal has a thick sole (fig. 175 *a*, Cal. No. 246692, U.S.N.M.) made of yucca-fiber cord woven over 12 warp threads and strengthened with an extra reenforcement of thick cord at the heel and where the ball of the foot rests. The side loops are of heavy cord passing through the thickened border, and to these loops are tied the cords which extend over the foot as a lacing. The construction of the sandal may be seen more clearly at *b* (fig. 175).

A specimen from Tularosa Cave is the most complete example of highly specialized footwear found in America. It is really a moccasin and is the nearest approach to that form of shoe attained by the sandal-wearing peoples. The resemblance of this shoe to the specimen described under figure 175 will be seen, but the latter stands one degree lower in scale of invention. The shoe (fig. 176 *a*, Cat. No. 246665, U.S.N.M.) consists of a woven sandal sole, around the sides of which loops are formed by roving in a strong fiber cord at the edge. The upper part of the shoe is secured at the toe, formed around the ankle, and passes along the sides of the foot. It is held in place by a lashing cord running through the loops and over the foot. (Fig. 176 *b*.) A feather cord passes through loops near the heel and around the ankle, helping to hold the shoe firmly to the foot. The structure of the shoe is shown diagrammatically at *c*. The shoe is stuffed with shredded grass. This remarkable shoe holds its shape perfectly and is warm and comfortable, the feather cord also being ornamental.

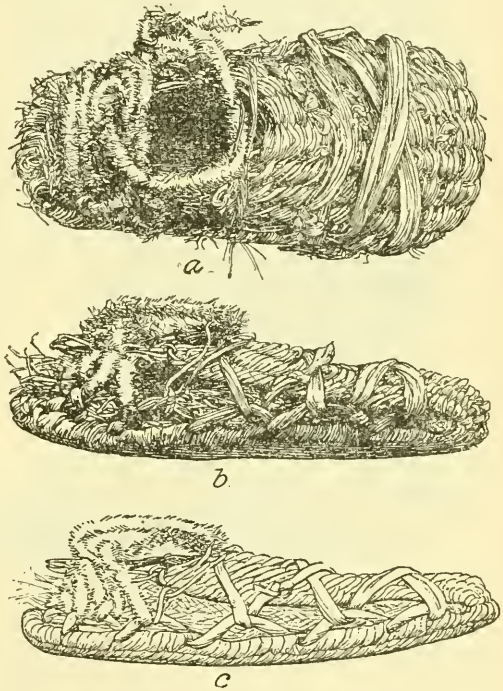



FIG. 176.—SHOE-SANDAL FROM TULAROSA CAVE.

Another specimen of extraordinary footwear consists primarily of a heavy sandal woven of yucca fiber and furnished with loops on the sides and at the heel. (Fig. 177 *a*, Cat. No. 246663, U.S.N.M.) Attached at the toe is a broad flap of wickerwork of brown fiber designed to cover the front portion of the foot. With the sandal was worn a heavy insole woven of strips of yucca leaf and padded with shredded

fiber, which is held in place by a turned-over edge of the weaving and by yucca thongs. (Fig. 177 *b*.) The assemblage of the various parts of this shoe is shown at *c*, and it was secured to the foot with a cord rove through the loops at the sides passing to and fro across the instep and around the ankle, as shown in figure 175. This shoe-sandal, together with the foot wrapping of coarse-woven cloth, would be ample foot protection during the heavy snows and low temperature of the winter at the altitude of the Tularosa Cave.

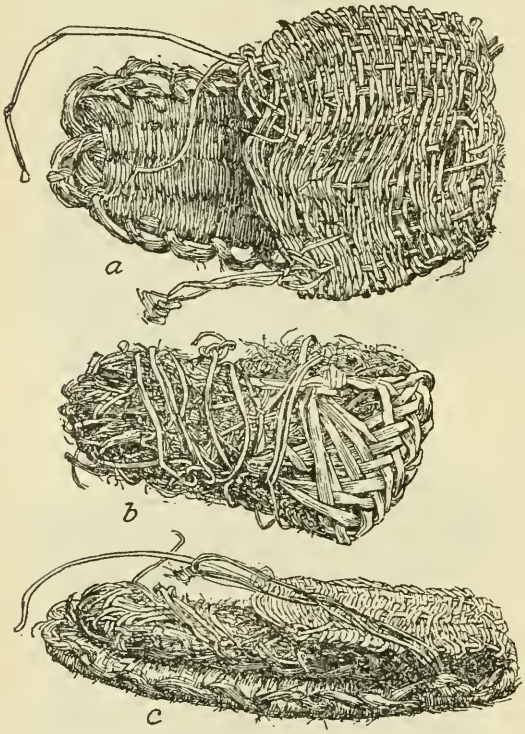



FIG. 177.—SHOE-SANDAL FROM TULAROSA CAVE.

HAIR.

The use of hair in textile work was not common, though cords of human and buffalo hair are sometimes found and were used in connection with the costume or for tying purposes. The only weaving in which hair was used was a small pouchlike object woven of dog's hair found wrapped up with a small mummy. A bundle of human hair carefully tied up and resembling somewhat a brush was discovered in Bear Creek Cave. The binding material is bow string, and it is supposed to have been an offering. Another curious object which appears to be a hair form comes from the Tularosa Cave. It consists of a mass of hair cord wound on a section of yucca leaf 5⅜ inches long. (Cat. No. 246447, U.S.N.M.)

LEATHER WORK.

The Tularosa people knew how to tan or soften skins, and many fragments of such leather are found in the cave. Thongs of leather were rarely used. Fragments of leather articles showing sewing and a piece of leather having yucca strips fastened through the margin, probably a bag, were found. The skin of a small animal having still the loops of yucca fastened in the margin by which it was stretched in drying was an interesting find. Bits of skin of antelope, moun-

tain sheep, deer, and other animals were abundantly scattered through the débris, and a sandal of buffalo skin with the fur attached came to light.

BASKETRY.

*Twined work.*—This method of basket weaving is not common, and in the finds from ancient sites of this region not many examples occur, but it has been observed in moccasins, mats, rude carrying hampers, mattresses, and feather cord clothing. The rush bed of a mummified baby found in a cave at the head of the Tularosa was twined. (See pl. 28, fig. 2.)

*Wrapped work.*—Only one specimen (see fig. 318) of wrapped work was seen, that of a miniature carrying basket which is wrapped like

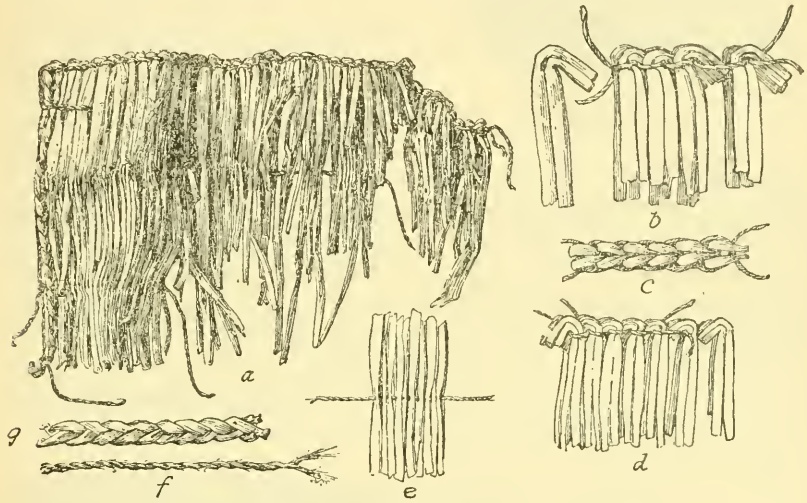



FIG. 178.—WEAVING OF RUSHES FROM TULAROSA CAVE.

those of the Mohave Indians. The frame has 8 braces instead of 4, as in the Mohave carrying basket. (Cat. No. 232099, U.S.N.M.)

*Tied work.*—Mats were made by tying rushes together side by side and also by threading. (See fig. 178, Cat. No. 246419, U.S.N.M.)

A number of fragments of a construction made of rushes (Cat. No. 246419, U.S.N.M.) were found in the débris of the Tularosa Cave, and judging from the care and skill displayed in their manufacture, one may surmise that the fragments are parts of a garment for the body, like the feather jacket. (See fig. 149.) One of the larger pieces (fig. 178 *a*) shows a portion of the top and side edge, the latter finished with a braid of rush. The method employed in making was to take pairs of rushes, bend over the ends, and secure them in series by two cords, as in figure 178 *b*, which shows the front; figure 178 *c* shows the overlapping of the rushes from above; and figure 178 *d*, the reverse. One cord is brought over the corner and for

a short distance down the side and secured in the body of the rushes and the other passes down the side and secures the braid binding, and to it at intervals are secured the horizontal cords on which the rushes are strung, shown in figure 178 *e*. The braid is represented at *g* (fig. 178), and the cord, which is of dasylirion fiber, at *f* (fig. 178). Rush texture found in the Bear Creek Cave was made by tying the strips together instead of threading them on cord, and when the rush has disappeared through decay, often the cords alone are found and resemble a cord chain which at first proves deceptive as to its real purpose. Mats made by threading rushes with a wooden or bone needle are manufactured by the Winnebago, Chippewa, Quinaielt, and other northern tribes.

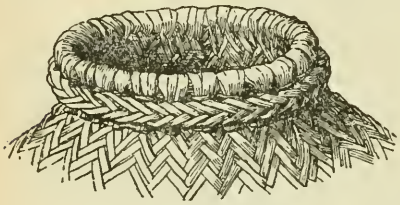


FIG. 179.—TOP OF TWILLED BASKET FROM BEAR CREEK CAVE.

*Twilled work.*—In portions of the Pueblo region it was customary to wrap the dead in matting, and frequently, when the soil was dry, fragments of such mats were discovered by excavation. In some of the caves, however, specimens of diagonal woven mats are very common. The art apparently has not survived in the Pueblo region, but it is known that the Hopi practiced mat weaving up to a few years ago. The baskets from the caves resemble in structure and material those made by the Pueblos at the present time, but the cave specimens are of very fine weaving, better in fact than any heretofore found in America and comparable with the best work in Mexico. (Fig. 179, Cat. No. 246160, U.S.N.M., Bear Creek Cave.)

The first mention of diagonal checker weaving was by Prof. W. H. Holmes, who secured specimens from cliff dwellings of Colorado.

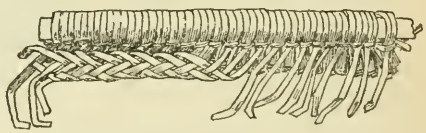
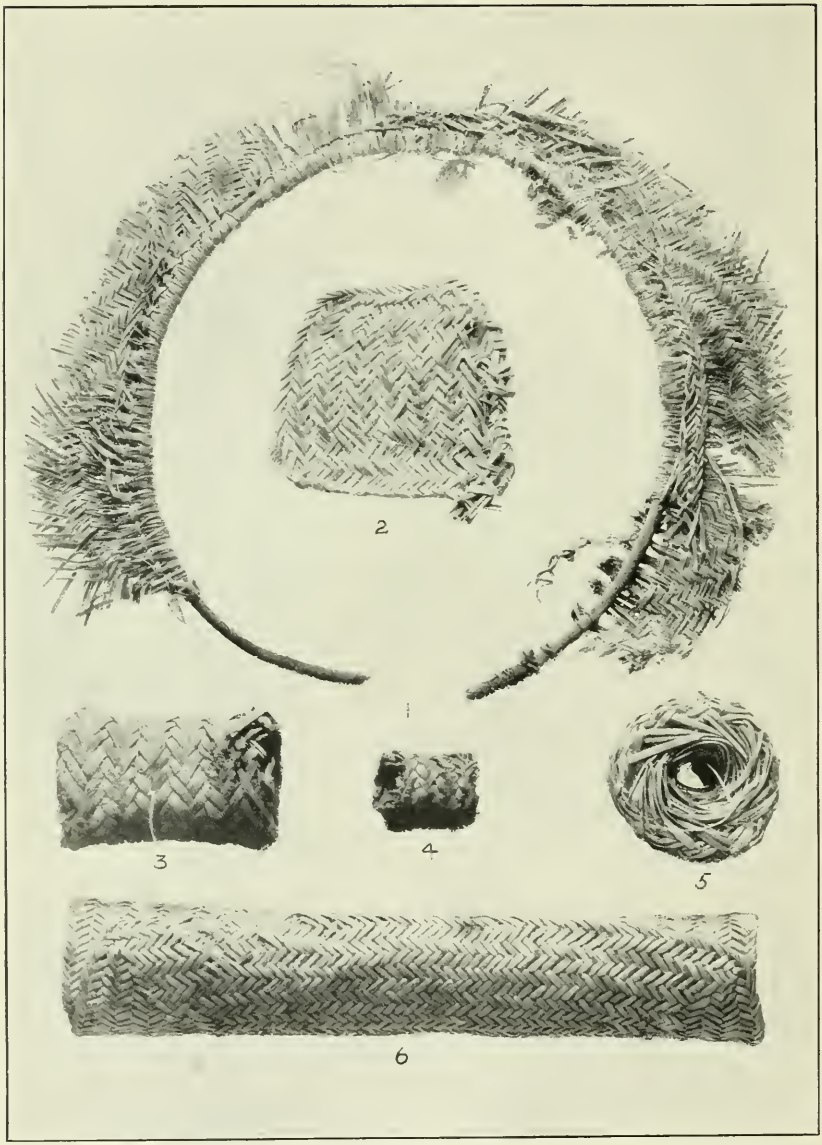


FIG. 180.—DETAIL OF BASKET RIM FROM BEAR CREEK CAVE.

A rim of a basket (Cat. No. 246160, U.S.N.M.), of excellent workmanship, form, and finish, was taken from one of the many offering pits in the floor of the Bear Creek Cave. It is twilled of dasylirion leaves or the leaves of a yucca, the strips smooth and of uniform size. The modeling, if one may use the term, of the splints into the form reached in this basket is a remarkable feat, and the finish of the rim even more noteworthy, as is shown in figure 180. (Pl. 17, fig. 3.) The splints are bent over a rod and held by a sewing. The free ends are then formed into a braid, which apparently has neither beginning nor end, termed by Mason "false braid." The process is very ingenious. A square tray with similar rim made of




TWILLED BASKETRY.

FOR EXPLANATION OF PLATE SEE PAGE 89.

very fine splints was also found. (See pl. 17, fig. 1.) Numerous fragments of twilled matting occurred in the Bear Creek Cave, but were not found in the Tularosa Cave.

Two cylindrical baskets tubular in shape were found in a small cliff dwelling on Spur Ranch. (Pl. 16, figs. 3, 4.) Their use is not known. The fan-shape mat (pl. 16, fig. 2, Cat. No. 232095, U.S.N.M.) and the rolled mat (fig. 6, Cat. No. 246161, U.S.N.M.) were both offerings in Bear Creek Cave. The fragment of twilled basket (fig. 1) is from Tularosa Cave. (Cat. No. 246423, U.S.N.M.)

From Bear Creek Cave comes a cylinder of basketry (Cat. No. 246424, U.S.N.M.) in twilled weaving of strips of the smooth leaf of the lechuguilla? skillfully worked into cylindrical shape, the loose ends being coiled in the interior. (Fig. 181 *a*, *b*, and pl. 16, fig. 5.) Four openings in the walls of the cylinder, caused by pegs which have been forced through the side, indicate that this object has been attached to a stick (fig. 181 *c*), possibly a digging stick, like those with stone weights found among the Indians of southern California.

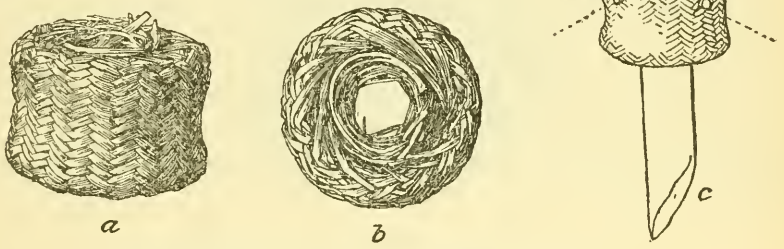



FIG. 181.—BASKETRY CYLINDER FROM BEAR CREEK CAVE.

Only one specimen of this character has been found in the caves visited by the Museum-Gates Expedition. Diameter, 4 inches; height, 2¼ inches.

*Diaper work.*—The specimens consist of tubes of agave stalk covered with basketry, the elements in two colors woven together to form patterns. (See figs. 329 and 331.) The nearest basketry of this character is found 1,500 miles away, near the mouth of the Mississippi River, among the Chetimacha and Choctaw tribes. This is the first specimen of the kind found in the Pueblo region and is one of the treasures from the great ceremonial cave on Blue River.

*Coiled work.*—Many examples of coiled baskets have been found in the caves of southern Arizona, where they were placed as offerings. Though usually of small size, they show excellently the methods and materials employed in their manufacture. The common type is more slender in coil than the modern Hopi sacred meal plaque, but the coil is made up of rods and welt instead of a bundle

of slender grass stems. Generally they have two rods side by side, surmounted by the welt, which engages the stitches by which the coils are held together. Two remarkable features are possessed by these baskets—they are constructed with the "lazy stitch," which has heretofore only been observed in southern California, and they are painted in red, black, and green on the exterior. On several occasions, during excavations in ancient Pueblo cemeteries, thin films of color accompanying decayed vegetable texture have been found. These were evidently remains of baskets. The painted coil baskets have an orifice in the center of the bottom, designedly left during the weaving, and for the purpose of placing them on a rod or paho to be set up in a shrine. (See fig. 317.) The materials of these baskets appear to be willow and bark.

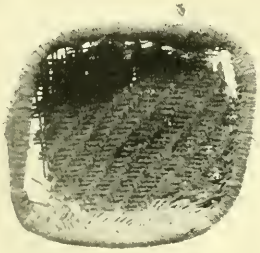
The second variety of coiling is the one usually employed by Indians when they wish to weave an impervious, serviceable basket. The strongest and most beautiful baskets are made in this way. Not all have been decorated with textile ornament, but a few examples have been painted. (Pl. 17, figs. 2, 4, 5.) They are not of the best workmanship, but a fragment found in the great ceremonial cave on Blue River shows what these ancient Pueblos could do, and but for this remnant we would not be able to say that the celebrants at the cave shrine made basketry which rivals the best California art.

The charred remains of a beautifully sewed coiled basket were found in the great Spur Ranch ruin, near Luna, New Mexico. It shows 17 stitches to the inch, and the foundation is two rods and a splint. (Cat. No. 231919, U.S.N.M.)

## RELIGIOUS OBJECTS.

### DEPOSIT OF OFFERINGS IN CAVES.

Throughout the region of caves or more or less deep rock shelters, especially prevalent in localities where tuff formations occur, are found deposits of ceremonial offerings consisting of bows and arrows, painted rods, and other material such as is described in this paper. These caves were secret places or more properly shrines like those which the present Pueblos use either near their villages or in distant places on mountains or at sacred lakes, springs, etc. The ancient shrines differ in importance, some of them containing few deposits; others contain great quantities of offerings, such as the one at Bear Creek, which was used for a very long time and seems to have been a sacred place for the inhabitants of a large territory. The northernmost ceremonial cave of this character known to the writer was discovered near the Pueblo of Zuñi, New Mexico, and the material from it, consisting of crooks, rounded rods, etc., is displayed in the Museum of the Brooklyn Institute, New York.



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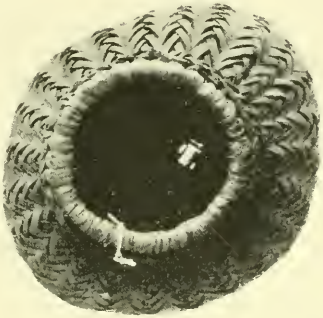

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TWILLED AND COILED BASKETRY.

FOR EXPLANATION OF PLATE SEE PAGE 90.

The cave cult, if so it may be termed, is responsible for the preservation of perishable objects connected with the religious beliefs of the ancient Pueblos, and this cult has also survived to the present. While the cave offered a secret, somewhat inaccessible place for the deposit of offerings which the uninitiated could not view without danger, it was especially a place for the worship of the beings of the underworld.

### PSYCHOLOGY OF THE PAHO.

The proceeding in offering to the gods who are believed to be in all respects like men in their desires and inclinations is entirely normal. The paho stands for the human supplicant, and is formed in accordance with this idea, painted, dressed, furnished with food, money, medicinal plants, etc., and feathers that, by the *orenda*, or magic power, of flying creatures carry petitions to the gods. The paho is thus the central feature of the sacrifice, and may be of any form or material or any object thought to be pleasing to or appertaining to a particular supernatural being whose characteristic personal offerings have been determined and fixed by the traditional usage of the religious organization.

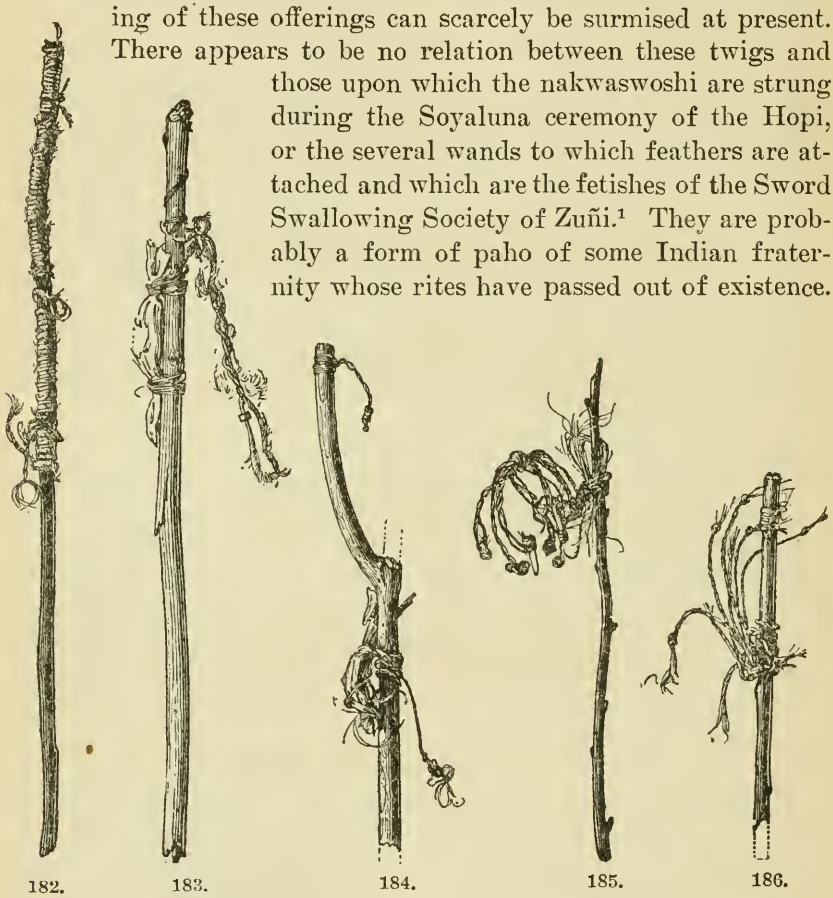
The offering prepared in a ritualistic manner, involving its materials, manufacture, and the spiritual attitude of the offerer, received its final intent through its bestowing in a shrine or other location and through the prayers said at that time. At an equal rate with the multiplication of the supernatural beings there developed a more extended knowledge of their attributes and an increased complexity in their worships, the offerings and the attendant symbolism became extremely varied, but the central idea remained simple, in that anthropomorphic gods like men were pleased with the things that are desirable to men.

With this in mind the description of the objects found in the Bear Creek and other caves of the region becomes less difficult. It is not possible to reconstruct the religious system, or present it as Mrs. Stevenson has that of the Zuñi, but the study which she has made with the Zuñi and that of Doctor Fewkes among the Hopi is of great service in affording comparisons with the ancient offerings and aids materially in bringing the subject out of the total darkness that has formerly obscured it.

### TWIG PAHOS.

Occurring in quantities in all the separate cave shrines were twigs of dark brown color taken from some bush which has a very shiny bark, probably some species of *Ptelea*. Many of these twigs had various attachments of windings of cotton cord and threads of yucca fiber which sometimes retain the bases of the quills to which they

were attached. (Figs. 182–186.) Somewhat frequently, also, ceremonial cigarettes were tied to these twigs. (Figs. 187, 191.) Rarely they bear bundles of corn husks containing food (figs. 189, 190) or an encircling ring of stone beads (fig. 188). Not often the offerings were placed on dressed twigs (fig. 194) and in a few cases the ornaments were applied to lengths of cane, as in figure 195. The meaning of these offerings can scarcely be surmised at present. There appears to be no relation between these twigs and those upon which the nakwaswoshi are strung during the Soyaluna ceremony of the Hopi, or the several wands to which feathers are attached and which are the fetishes of the Sword Swallowing Society of Zuñi.[1] They are probably a form of paho of some Indian fraternity whose rites have passed out of existence.

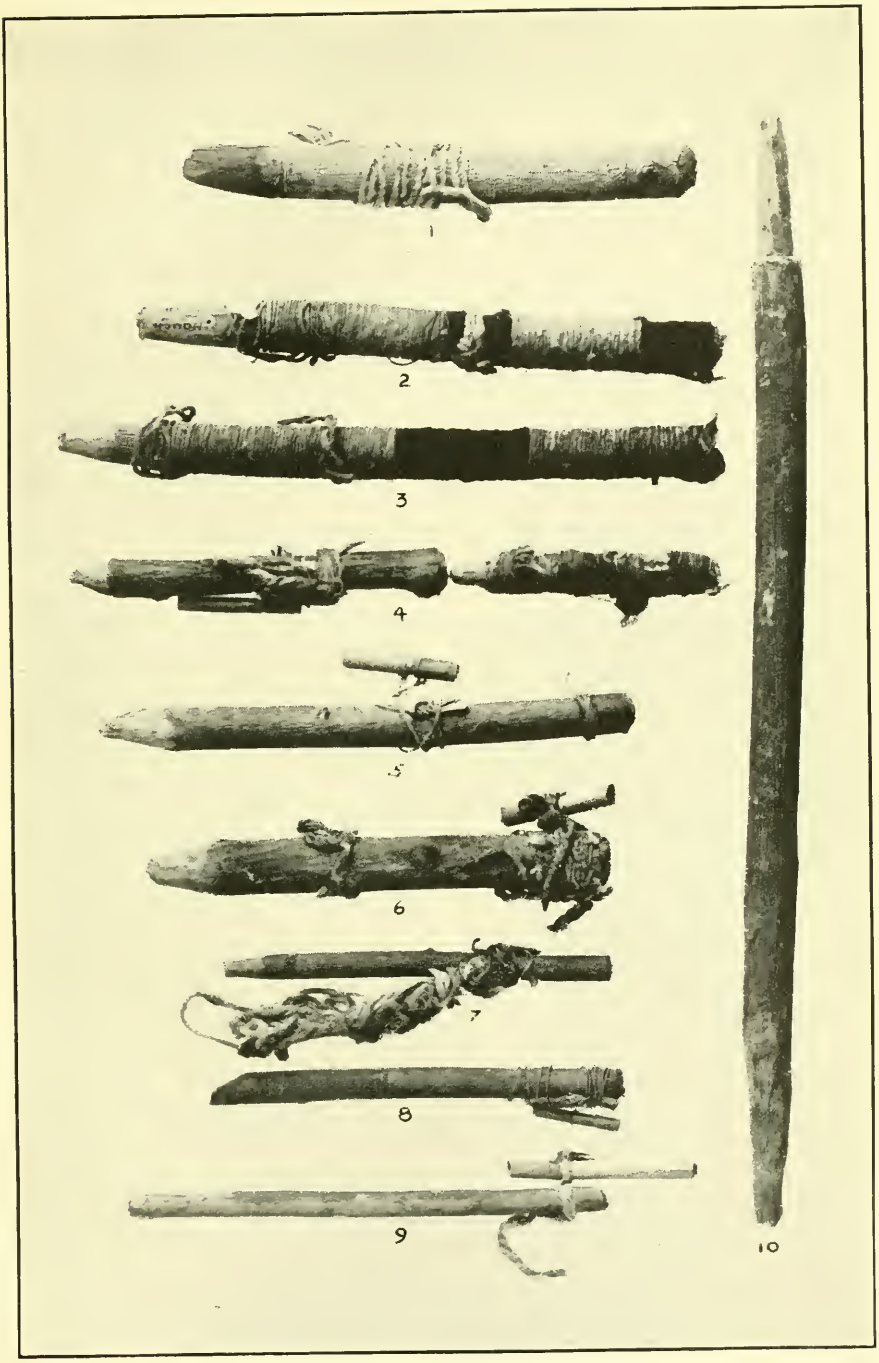



FIGS. 182–186.—TWIG PAHOS FROM BEAR CREEK CAVE.

STUB PAHOS.

A large number of pahos somewhat of the type familiar among the present Pueblos is found in most of the caves of this region. They consist of short sections rudely cut from saplings and sharpened at one end. Usually the bark was left on these pahos. Ceremonial cigarettes are attached to them. (Pl. 18, figs. 4, 5, 6, 7, 8, and 9.)

[1] See 23d Ann. Rept. Bur. Amer. Ethnology, plate 112.



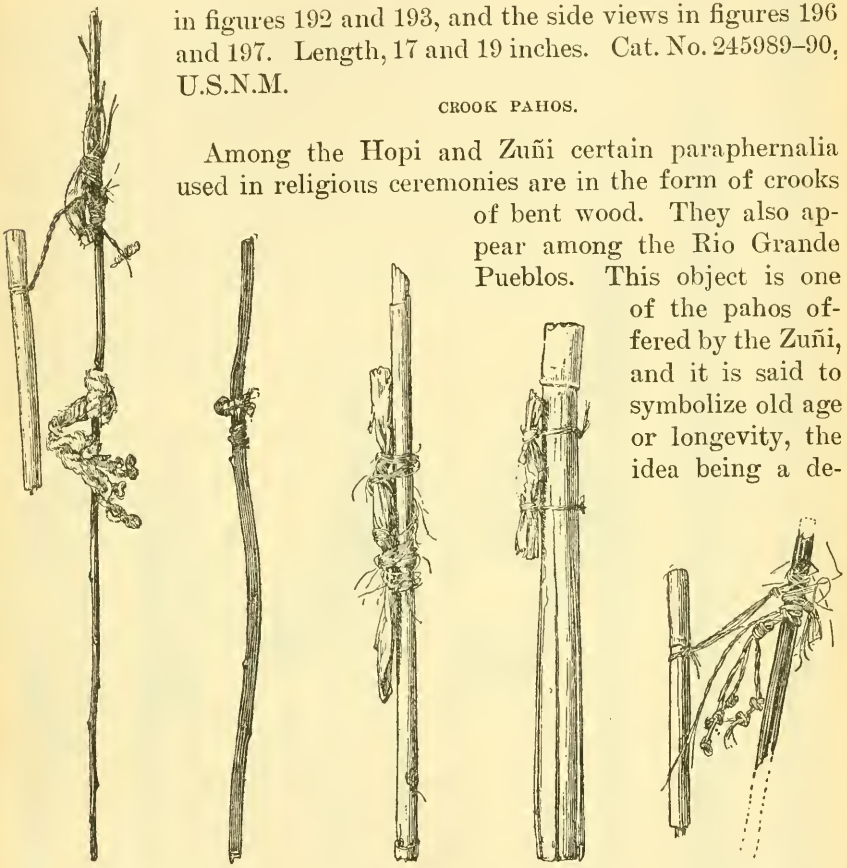

STUB PAHOS FROM BEAR CREEK CAVE.

FOR EXPLANATION OF PLATE SEE PAGE 92.

A strand of colored cotton cord in figure 7, or a wrapping at the top and at the middle may be seen in figure 8, or they are wound with black, white, red, and yellow cotton cord, as in figures 1, 2, and 3. They are sometimes quite large, as in figure 10, and the smooth pahos are painted red. Very few pahos carved to represent the human face were found. Two examples are shown in figures 192 and 193, and the side views in figures 196 and 197. Length, 17 and 19 inches. Cat. No. 245989–90, U.S.N.M.

CROOK PAHOS.

Among the Hopi and Zuñi certain paraphernalia used in religious ceremonies are in the form of crooks of bent wood. They also appear among the Rio Grande Pueblos. This object is one of the pahos offered by the Zuñi, and it is said to symbolize old age or longevity, the idea being a desire to live until the back is bent with age. Another object like the crook is the rattle of the Zuñi rain priests of the nadir decorated with feathers from which shells are suspended, forming a ceremonial rattle, and a similar rattle is used in the Hopi Flute ceremony. Among the Hopi, crooks are mounted in clay pedestals and placed before the altar of the Antelope Fraternity in the



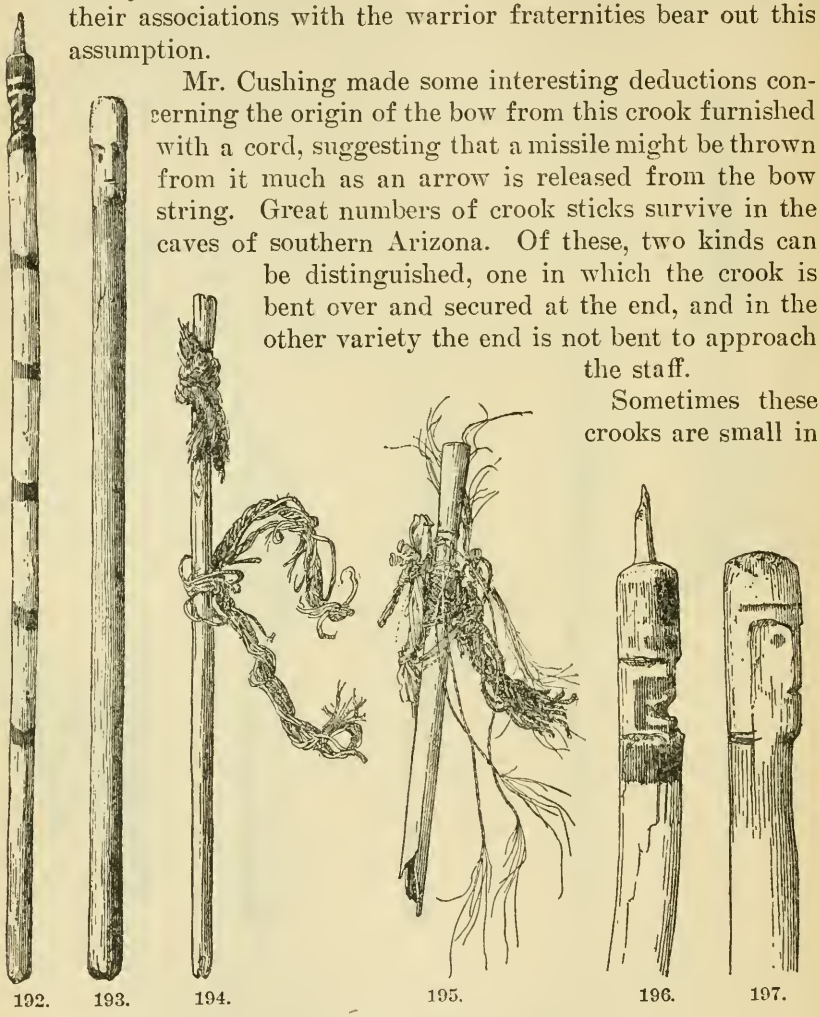
187. 188. 189. 190. 191.

FIGS. 187–188, 191.—TWIG PAHOS FROM BEAR CREEK CAVE.
FIGS. 189, 190.—REED PAHOS FROM BEAR CREEK CAVE.

Snake ceremony. These have a feathered cord tied from the end of the crook to the place of insertion in the pedestal. Doctor Fewkes writes that these sticks have been called warrior prayer sticks and are symbols of ancient weapons. He further points out that their associations with the warrior fraternities bear out this assumption.

Mr. Cushing made some interesting deductions concerning the origin of the bow from this crook furnished with a cord, suggesting that a missile might be thrown from it much as an arrow is released from the bow string. Great numbers of crook sticks survive in the caves of southern Arizona. Of these, two kinds can be distinguished, one in which the crook is bent over and secured at the end, and in the other variety the end is not bent to approach the staff.

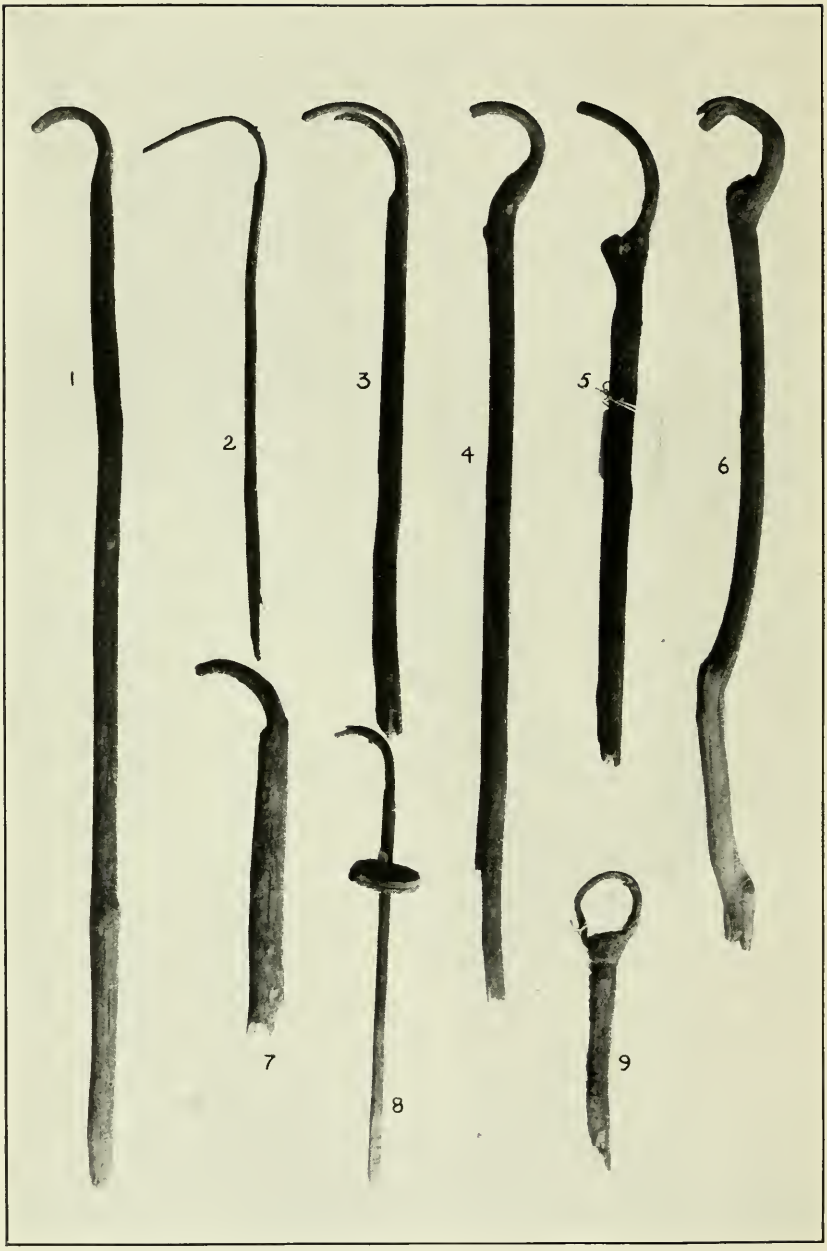
Sometimes these crooks are small in



192. 193. 194. 195. 196. 197.

FIGS. 192, 193.—STUB PAHOS FROM BEAR CREEK CAVE.
FIG. 194.—TWIG PAHO FROM BEAR CREEK CAVE.
FIG. 195.—REED PAHO FROM BEAR CREEK CAVE.
FIGS. 196, 197.—HEADS OF STUB PAHOS FROM BEAR CREEK CAVE.

size and are used as symbolic offerings, but generally they are large enough for effective implements and frequently the length of a throw stick. None of the crooks show cord attachments. It may be possible that these crooks are a form of throwstick, but the




CROOK PAHOS FROM BEAR CREEK AND JOHNSON CAVES.

FOR EXPLANATION OF PLATE SEE PAGE 95.

shafts of none of them show any particular adaptation to facilitate grasping.

A specimen collected from a cave near Silver City, New Mexico, by H. H. Rusby, is shown in fig. 198. It is a smooth rod of wood, bent into a crook, and showing the nicks made in bringing it to shape. Frequently the end of the crook is fastened to the stem of the rod, thus forming a closed loop. (Plate 19, fig. 9, Cat. No. 45616, U.S.N.M. Diameter, 3¾ inches; length, 6 inches.)

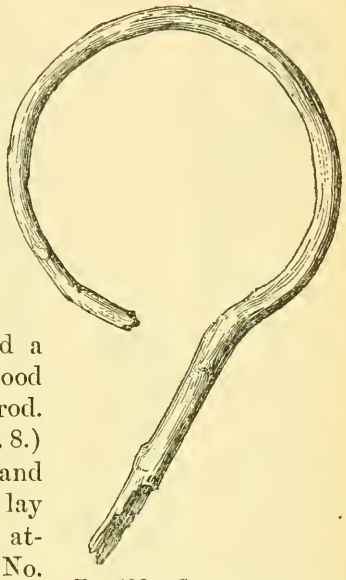


FIG. 198.—CROOK PAHO FROM SILVER CITY, NEW MEXICO.

Some specimens consist of a rod of wood bent into a crook at one end, and a perforated disk of wood was passed over this rod. (Fig. 199 and pl. 19, fig. 8.) The disk is grooved, and in this groove probably lay a cord, to which was attached feathers. (Cat. No. 246539, U.S.N.M. Length, 9½ inches.) The specimen was found as figured in a shrine on the floor of the Bear Creek Cave.

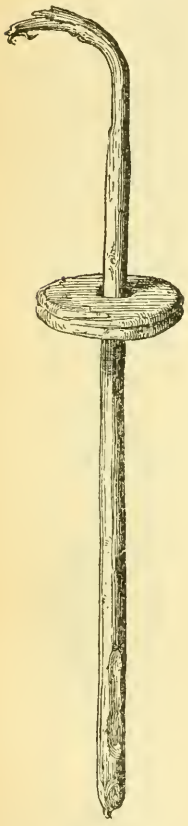


FIG. 199.—CROOK PAHO WITH WOODEN DISK FROM BEAR CREEK CAVE.

Plate 19 shows a variety of crooks, principally from Bear Creek Cave. It will be observed that the shafts of most of them are broken. Figure 1 is a perfect specimen, measuring 22 inches in length. It is probable, however, that a number of these crooks were longer than this. They are rudely sharpened at the butt in the manner of the pahos, and there is, therefore, reason to believe that they may have been stuck up in the ground, like the Soyaluna and Antelope pahos of the Hopi. The remaining specimens on the plate, Nos. 2 to 7, are, some of them, neatly finished; others are made from crooked branches. The specimen to the right near the bottom of the plate, fig. 9, is from Johnson Cave on Blue River. It is painted red and black. One of the specimens has been blackened with smoke and decorated with zigzag incises cut with a stone chip through the black coating.

A number of crotch pahos (fig. 200) from Bear Creek Cave are in the collection, and they are provisionally related to the crook. The specimen shown is painted red. (Cat. No. 246026, U.S.N.M. Length of fragment, 3 inches.)

FIG. 200.—CROTCH PAHO FROM BEAR CREEK CAVE.

ROUNDEL PAHOS.

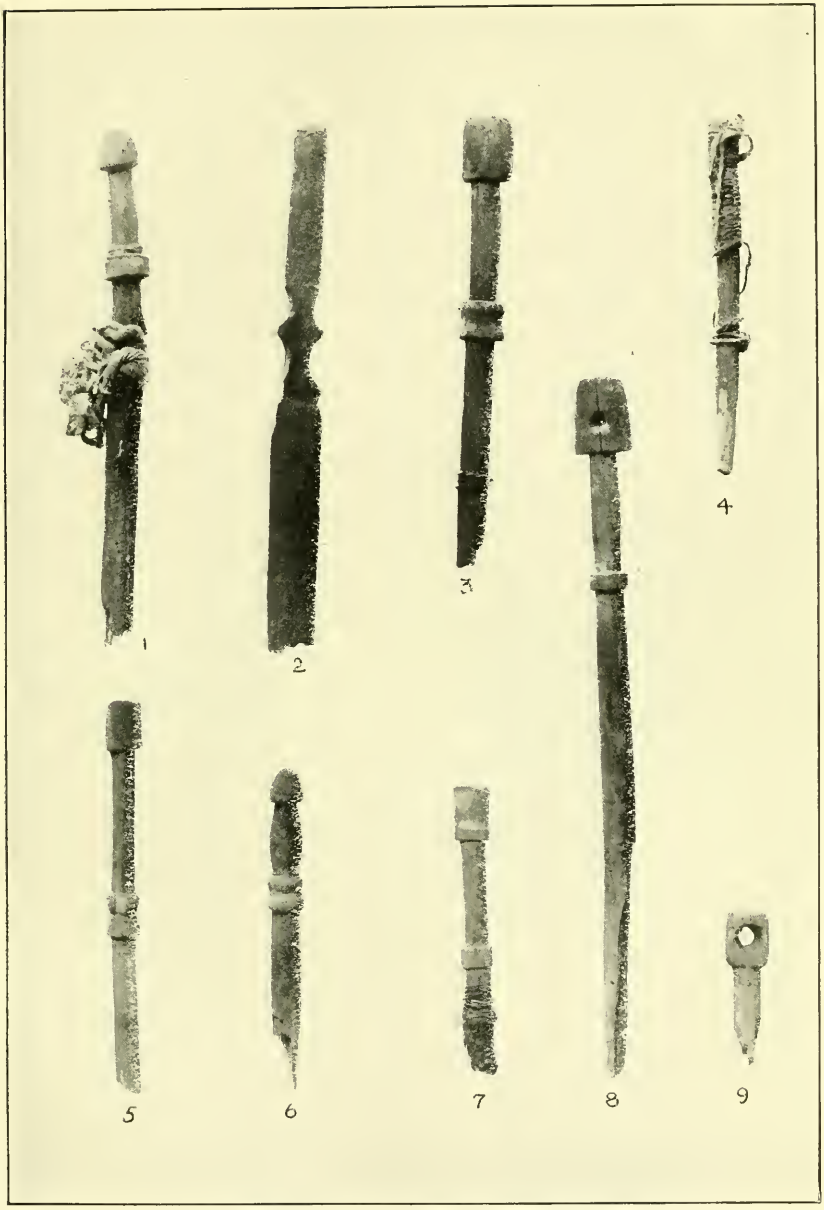
There is a group of pahos which occurs in some number in the Bear Creek Cave, consisting of dressed rods about one-half inch in diameter, showing great care and considerable skill in their manufacture. All the specimens found were broken, and the only one which gives any indication of their length was a staff which measures 36 inches. The specimen shown in figure 201 is the upper portion of a staff worked out from a larger stem of wood, is painted black and green and has wrappings of yellow and brown cotton cord around it. The remains of a wrapping of yucca fiber, probably for the attachment of feathers, is preserved around the lower roundel. (Length, 9 inches. Cat. No. 245993, U.S.N.M. Bear Creek Cave, Blue River, Arizona.)

A variety of roundels is shown on plate 20. They are painted red, green, and blue, and a few of them retain cord wrappings. Generally they have a button-shaped head (figs. 1 and 6), or flattened (figs. 3, 5, and 7), and sometimes a hole is drilled through the flattened head (figs. 8 and 9). The roundels are sometimes plain, as in figures 1, 7, and 8, or grooved, as in figures 3, 4, 5, and 6. The roundel, figure 2, suggests the throwstick. (See p. 19.)

FIG. 201.—ROUNDEL PAHO FROM BEAR CREEK CAVE.

Pahos carved very much in the same way as these from the Blue River were found by Doctor Fewkes[1] in the graves at Sikyatki. Some of the fragments appear to be of rods of considerable size. Fewkes connects these pahos with the Flute Society. Specimens like these have been found in the cliff houses of Mesa Verde and in San Juan Valley, New Mexico. The Hopi at present make use of splashing sticks for agitating the waters of the spring during the flute ceremony. These number seven, carried in a pack and are about a foot long. They have a roundel carving near the top. Similar sticks have been found in the Balcony House in the Mesa Verde. It is possible that these rods may have some connection with those under discussion.

[1] 17th Ann. Rept., Bur. Amer. Ethnology, pt. 2, p. 736.




ROUNDEL PAHOS FROM BEAR CREEK CAVE.

FOR EXPLANATION OF PLATE SEE PAGE 96.

The long roundel staffs found in Bear Creek Cave suggest the object carried in the hand of the figure of a Mexican deity figured in Doctor Eduard Seler's collected works. (Vol. 1, 1902, p. 839.) It has a rounded tip, below which is a small shield with cross figure, below this is a cord wrapping apparently securing a row of bells and feathers and at intervals two globular wrappings of cord, binding feathers to the staff.

BOW PAHOS.

The custom of making miniature bows and arrows for ceremonial purposes has been observed in several American tribes and perhaps formerly was extensive, as there are many traces of a bow cult in America outside of the Pueblo region, where it is still current. An interesting set of this character from the Nishinam Indians (Maidu Stock) of California collected by Stephen Powers is in the National

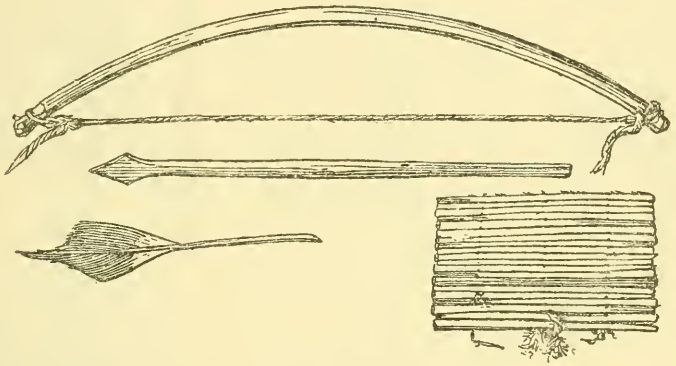


FIG. 202.—CEREMONIAL BOW AND ARROWS FROM THE NISHINAM INDIANS, CALIFORNIA.

Museum. (Cat. No. 21455, U.S.N.M.) It consists of a bow 7½ inches long, a partially stripped woodpecker feather and a mat of woodpecker quills 1¼ by 2¼ inches in diameter. (Fig. 202.) This outfit was stated by the collector to be a charm for the chase. Bows of about half the standard size and beaded excellently are made by the Klamath and Modoc and are of some ceremonial importance. Miniature bows and arrows form frequently a part of the paraphernalia with which masks are decorated among the southern Alaska tribes. These examples suggest the possible ranges of the idea, but not enough information is at hand to connect them with the bow cult.

Among the Pueblo, however, the bow cult was prominent and prevailed over a wide region and, where offerings were made of various kinds in caves by the ancient people, the greater number of these objects were bows and arrows of regular size or in the form of models.

The first reference to arrow customs in America is found in the narration of Castañeda, who writes that the tribes of the river Señora, northern Mexico, "Have some little huts for shrines, all over the outside of which they stick many arrows like a hedgehog. This they do when they are eager for war."[1] At the present time there are arrow shrines in the neighborhood of Zuñi. "To insure success in the hunt arrows are shot into a vertical fissure in an inaccessible rock on the west wall of Tówayallane (Corn Mountain). A hundred or more arrows were to be seen in this cleft in 1879." Mrs. Stevenson also writes that the Indians shoot at a pictograph on the face of a cliff 30 miles southwest of Zuñi and success is divined for the one whose arrow hits the mark.[2]

FIG. 203.—BUNT HEAD CEREMONIAL ARROW FROM BEAR CREEK CAVE.

In Mexico at the time of the conquest offerings made to those who had died in war were four small arrows a span in length, secured each to a little torch by means of cotton cords and with them were placed two unsalted tamales. The offering was deposited on the tombs and when it had remained there all day, at night was set afire and burnt to ashes. The latter were then interred over the grave of the dead in honor of the warriors.[3] They also set apart a day for making arrows belonging to individuals for shooting.[4]

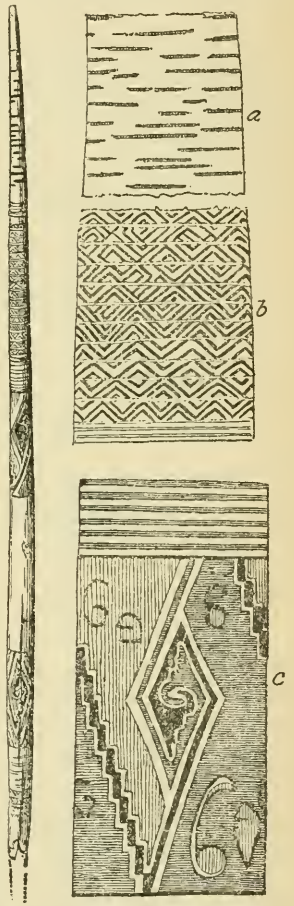



FIG. 204.—DECORATED BOW FROM BEAR CREEK CAVE.

Ceremonial arrows among the Huichols are described by Lumholz[5] and it is apparent that these objects bear a close relationship to those from Bear Creek Cave and other caves of this region, as well as

[1] The Coronado Expedition. 14th Ann. Rept. Bur. Ethnology, p. 515.
[2] The Zuñi Indians. 23d Ann. Rept. Bur. Amer. Ethnology.
[3] Sahagun, p. 145. Paris, 1880.
[4] Idem., p. 145.
[5] Unknown Mexico, vol. 2, New York, 1902, pp. 201–205.

those in present use by the Zuñi. The Huichol painted arrow with its various attachments is a paho. The arrows made for the family worship also bear a close analogy to those pahos made as family offerings by the Zuñi.

The attachment of bows, shields, food, beads, etc., to the Huichol arrow paho has counterpart in the paho of the Zuñi and Hopi and that of the ancient Pueblo described in this paper, thus several arrow offerings or pahos found in Bear Creek Cave having lashed across the

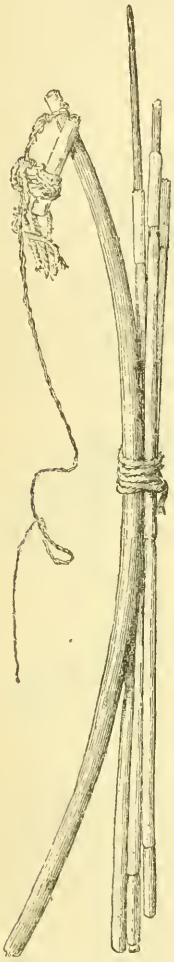


FIG. 205.—CEREMONIAL BOW AND ARROWS FROM BEAR CREEK CAVE.

FIG. 206.—CEREMONIAL BOW FROM BEAR CREEK CAVE.

FIG. 207.—CEREMONIAL BOW WITH CIGARETTES FROM BEAR CREEK CAVE.

end of the foreshaft small tubes of reed or cylinders of wood (fig. 203) suggest the "medicine arrows" spoken of by Cushing in his Zuñi Folk Tales.[1] There were similar arrows with cane tubes on the ends charged with a charm liquid made by the grandmother of the war gods from flesh rubbed off her

[1] Zuñi Folk Tales. New York, 1901, p. 335.

arms. This medicine was supposed to make the enemy weak and womanly.

The remains of a splendid bow were found standing with others against the back wall of the Bear Creek Cave where a slight alkaline seepage issues, and for this reason the bow has slowly decayed for about one-third of its length. It is a smoothly finished and good example of the better bows of the region. (Fig. 204 *a*.) The decorative patterns on this bow are especially interesting. Near the end the design is narrow bands, lined, and the lines of differing length, which appear to represent mottled bark. (Fig. 204 *a*.) This area is demarked from the next by a band of horizontal lines going around the bow. The next area is of frets (fig. 204 *b*), arranged in bands and representing weaving of twilled splints, as on the flutes. (See fig. 329.) An area of bands formed by a grouping of parallel horizontal lines follows and then a design in red, green, black, and yellow

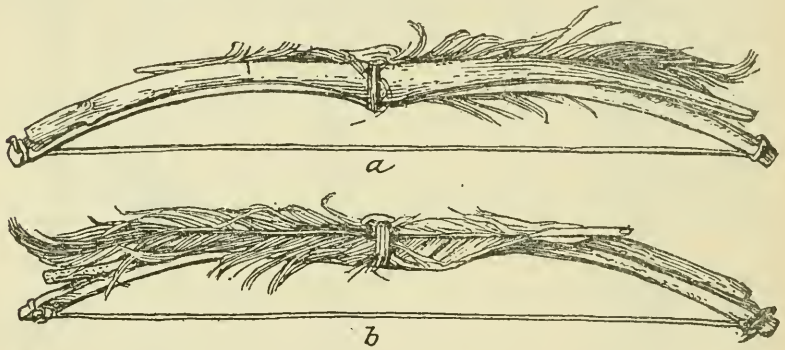



FIG. 208.—CEREMONIAL BOW FROM ZUÑI SALT LAKE.

which resembles Mexican art. (Fig. 204 $c^1$.) The central design appears to be the interlocking bird fret but the comma-like figures on the background are unintelligible and apparently are not ancient Pueblo. (Cat. No. 473 of the Gates collection.) The bow in its present state is 36 inches long; original length, 54 inches.

A description of some of the miniature specimens follows:

Bow of dressed wood painted red, the string of yucca fiber, painted also with red ocher. One ceremonial cigarette remains attached to the string. A bundle of three arrows is tied to the bow with a cotton cord. They are slender reeds having wooden foreshafts painted red thrust in the end. (Fig. 205, Cat. No. 232164, U.S.N.M.; length, 17½ inches; arrows, 19½ inches long.)

Bow made of a dressed branch or stem painted red, green, and black on the end portions and left plain in the middle. The ends are wrapped in corn husk. (Fig. 206, Cat. No. 232165, U.S.N.M.; length, 18 inches.)

Bow, a smooth finished stick painted green with copper carbonate and supplied with a yucca fiber string colored with red ocher. (Fig.

[1] Peñafiel, Indumentaria Mexicana, pl. 24, figures a bow of the same shape and decorated like some of those from Blue River.

207.) Near the ends of the bow is attached to the bow cord a ceremonial cigarette, each cigarette with its brown, loose-twisted cotton cord bandage which retains the quills of feathers. The bundle of tiny arrows which was attached to the bow at the time of its offering has become detached. (Cat. No. 23163, U.S.N.M.; length, 17 inches.)

Several survivals occurring among the Pueblos are described as follows:

Miniature bow made from a twig painted red on the belly and sinew string and to the latter is attached a feather arrow. (Fig. 208, *a* and *b*.) This object was deposited as an offering below the water on the edge of the salt lake, 40 miles southwest of Zuñi. This lake, which occupies the crater of an ancient volcano is much reverenced by the Zuñi, who journey thence yearly to procure salt. (Cat. No. 129066, U.S.N.M., collected by Mrs. M. C. Stevenson; length, 4 inches.)

Small bow painted red and green and having tied to it two arrows, also painted with these colors. (Fig. 209.) This object is an offering customarily presented by the sacred dancers (*Kok-ko*) to little boys. Other specimens had baskets attached. Among the Zuñi, Hopi, and a number of other Pueblos, painted objects quite similar to those which are found in caves are used in ceremonies, no doubt perpetuating the same ideas from the ancient times. (Cat. No. 234285, U.S.N.M., Zuñi, New Mexico; collected by M. C. Stevenson; length, 15 inches.)

Small, neatly made bow with sinew string, belonging to the Apithlashiwani or Priesthood of the Bow. To the back of the bow is attached a ring of corn husk representing a shield, and to this ring is attached another miniature bow over which radiate four arrows of corn husk (fig. 210), the tying material being yucca leaf strips. (Cat. No. 58619, U.S.N.M., Zuñi Indians, New Mexico.)

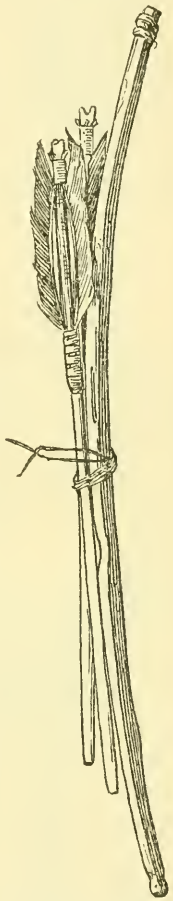


FIG. 209.—CEREMONIAL BOW FROM ZUÑI.

### BIRDS IN RELIGIOUS OBSERVANCES.

The earliest information on the native tribes of the southwestern United States and Mexico shows the great importance of birds in cult, and nowhere else has there been a development which compares with it in extent and complexity. The bird form is represented in the round in wood, clay, and stone, or as a preponderant design in surface decoration, and sometimes the whole body is used in ceremony, but these features are insignificant compared with the employment of the plumage.

The taking of birds for the feathers, assiduously carried on by these Indians, became in parts of the region an industry, as in Mexico, where

the idea of cult grew with the esthetic idea and where feathers were collected for trade with other tribes far and near. The customs of the present Pueblos—the Hopi, for instance—with regard to the collection of bird pelts are traditional and are, no doubt, similar to those practiced by the ancient Pueblos.

Hopi knowledge of bird life is thorough,[1] in fact surprising to a trained naturalist, who finds that their nomenclature of the avian topography is quite as exact as that of science, and that the Indian's acquaintance with the habits of birds is really extraordinary.

The collector of bird skins is generally the one to whose use the feathers are to be put; or the duty may be delegated to members of the secret orders, who take the birds ritually; that is, the use at the time of capture of appropriate prayers and ceremonies, as in the case of the eagle.[2] The birds must be trapped, killed by suffocation, and not mutilated, and herein is a subject which will repay investi-

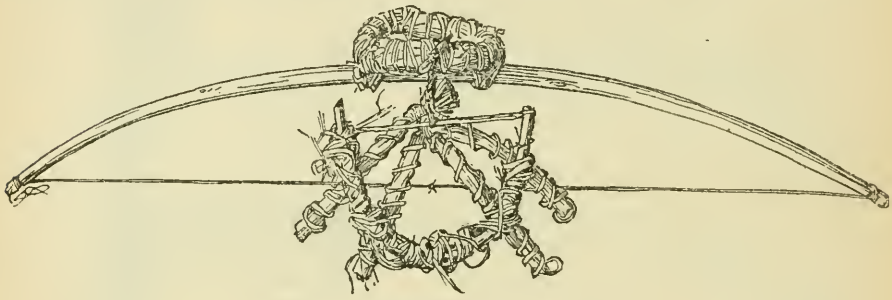


FIG. 210.—CEREMONIAL BOW FROM ZUÑI.

gation. The skins are dried, carefully wrapped in cotton cloth, put in an oblong rectangular box excavated from a single piece of wood, and guarded with other sacred paraphernalia.

During preparations for ceremonials I have observed the selection of the proper feathers for pahos and have been struck with the exactness of the methods, which reminded me of the scrutiny of the ornithologist in comparing two species. The complexity of Hopi and other Pueblo ceremonials is so great, and the feathers appropriate to each feature of the rites are so numerous, that the description of the minutiæ of their kinds, uses, etc., would apparently fill a volume.

Some of the considerations which may have determined the use of feathers in religious observances are suggested. The colors of feathers are permanent, often vivid and always present some element of beauty; they are, therefore, more useful than flowers which, though highly appreciated by most peoples, soon fade. Their colors are various enough to accord with color ideas related to beings, world-directions, etc., which enter into the philosophy of uncivilized tribes.

[1] E. A. Mearns, Ornithological Vocabulary of the Moki Indians, American Anthropologist, vol. 9, December, 1896, p. 391.

[2] J. Walter Fewkes. Property Rights in Eagles Among the Hopi. American Anthropologist, vol. 2, n. s. October–December, 1900, p. 690.

The mystery of down which seems to move under the influence of intangible beings and float in the air as though imbued with the power of birds' flight or the lightness of smoke or the buoyancy of clouds has also appealed to uncivilized man and given him, like incense, a way to the gods.

Birds are the most attractive members of the animal kingdom. They are not dangerous to man and they excite neither fear, anger, nor disgust; on the contrary, from their strange and wonderful habits, above all that of flight, they excite interest and admiration. Flying, swimming, and diving are mysterious, and the feathers being the instruments of this action are symbols of the magic power or *orenda* of flight.

FIG. 211.—CARVED HEAD OF BIRD STAFF FROM BLUE RIVER.

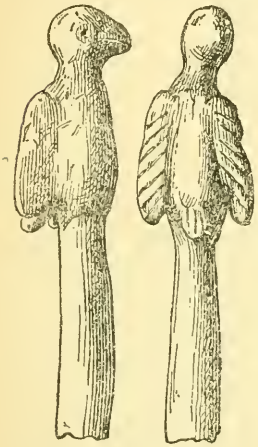


FIG. 212.—CARVED HEAD OF BIRD STAFF FROM BEAR CREEK CAVE.

The Pueblos have classified feathers, as has been intimated, as having certain qualities appertaining to their worship. Most feathers are good, but the plumage of certain birds is maleficent, that of the owl among the Zuñi being employed in witchcraft. The feathers also of certain birds—the crow, for instance — are not used at all.

BIRD CIRCUIT SYMBOLISM.

Examples of the four direction bird symbol (see figs. 85, 86) are common in the Pueblo region, the ancient southern sites, in the Mississippi Valley ruins, and sporadically throughout North America. North of Mexico the symbol is not highly developed, but in Mexico it has become complex, due to calendric progress. An interesting resemblance between the Pueblo and Mexican bird circuit is that in both symbols the parrakeet occupies the four corners of the square.[1]

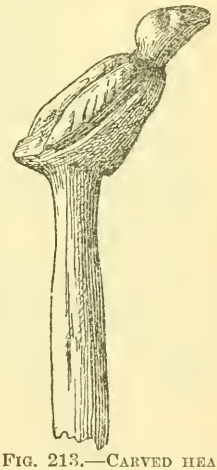


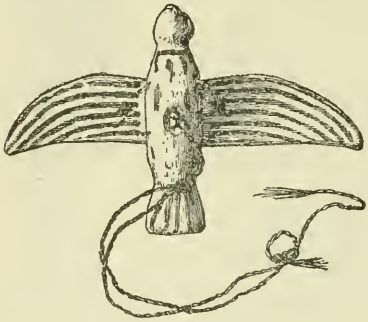
FIG. 213.—CARVED HEAD OF BIRD STAFF FROM BEAR CREEK CAVE.

A few ceremonial staffs having bird effigies carved on the upper end were taken from the deposits of the Bear Creek and Johnson caves on Blue River, Arizona. (Figs. 211–213, Cat. Nos. 552 Gates

[1] See calendric cross of the Fejervary codex in 3d Ann. Rept. Bur. Ethnology, 1882, pl. 111, facing p. 32.

Coll., 246717, 246552, U.S.N.M.) It is possible that these objects were part of the paraphernalia of an altar like the birds on the posts of several Zuñi altars.[1]

The bird figures mounted on rods, used by the Hopi and Zuñi for ceremonial purposes (figs. 214, 215, Cat. No. 68779, U.S.N.M.), are presumably the modern representatives of the similar objects from the ruins, which, as has been shown, comprise both composite figures and those carved on a staff. The latter form is represented in Mexico, where it is connected with the migration legend in which the tribes were said to have been guided by a fabulous bird. The Lienzo de Jucutacato[2] depicts the bird guide mounted on a staff which appears to have been thrust in the ground at the end of each stage of the migration, in which the Tarascans and eight Mexican tribes emerge from the seven caves in the west and, led by the bird, seek their final seats in Mexico.



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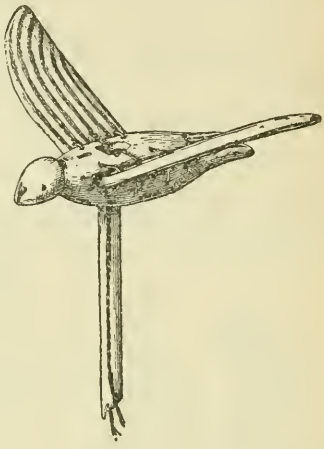


215.

FIGS. 214, 215.—MARIONETTE BIRDS OF THE HOPI INDIANS, ARIZONA.

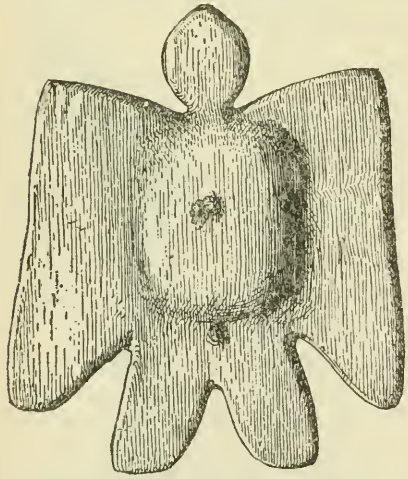
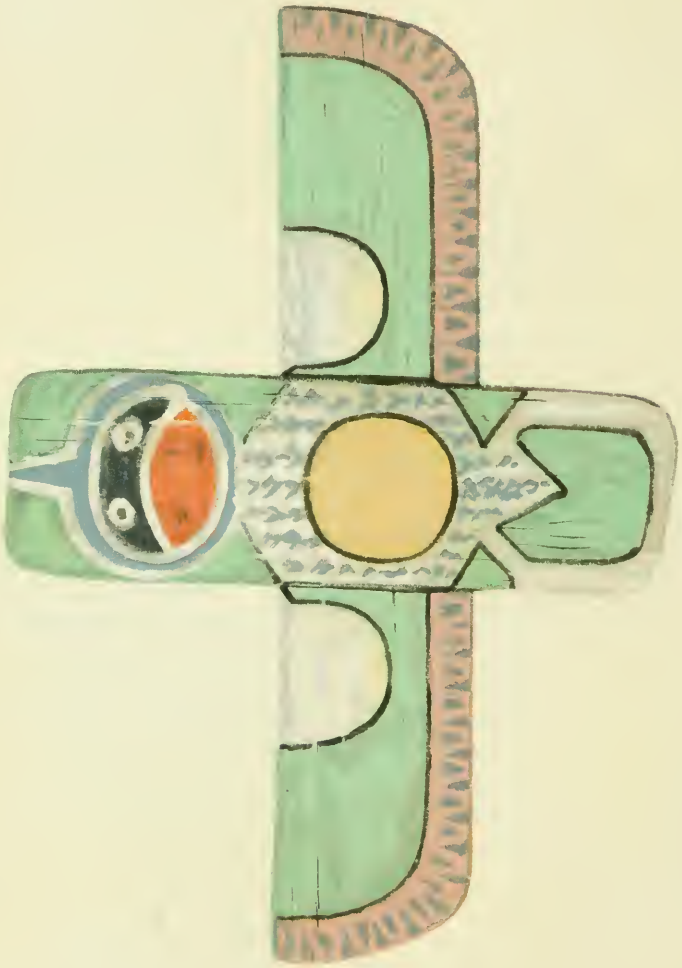


FIG. 216.—CARVED BIRD FROM SILVER CITY, NEW MEXICO.

From a cave south of the Gila River, near Silver City, New Mexico, comes a specimen carved from a single piece of soft wood, rudely made to represent the form of a bird, and painted black on the flat surface and yellow below. A white margin is painted on the edge and a band across the tail. (Fig. 216.) In the center of the body and at the tail are remains of a yucca fiber cord by which the

[1] 23d Ann. Rept. Bur. Amer. Ethnology, pls. 58, 59, and 116.
[2] Report Smithsonian Institution, 1886, p. 307.



PAINTED BIRD OFFERING FROM BEAR CREEK CAVE.

FOR EXPLANATION OF PLATE SEE PAGE 105.

bird was secured to a staff. There is a probable relationship between this object and the staffs with a bird carved on the upper extremity. (See figs. 211–213.) The Hopi make birds with movable wings that seem closely related to the joinery birds from the caves (see figs. 214, 215). (Cat. No. 35262, U.S.N.M.; length, 6¼ inches; width, 4¾ inches. Collected by Henry and James K. Metcalf.)

FIG. 217.—BIRD DESIGN ON PLUME STAFF FROM BEAR CREEK CAVE.

A notable specimen of ancient art was taken from the Bear Creek cave by visitors in the neighborhood at the time the Museum-Gates exploration was in progress. A photograph was secured, but an attempt to reclaim the specimen failed. It consists of two strips of wood crossed at right angles and sewed together with yucca cord, representing a bird, probably a woodpecker, in flight. (Pl. 21.) The colors used in painting this object are white, black, salmon, yellow, red, blue, and green, showing greater variety and a greater discrimination in shades of color than in a majority of specimens from this locality.

A flat staff decorated with a very simple bird convention and for supporting a plume paho is shown in figure 217. (Cat. No. 246580, U.S.N.M.; Bear Creek Cave.)

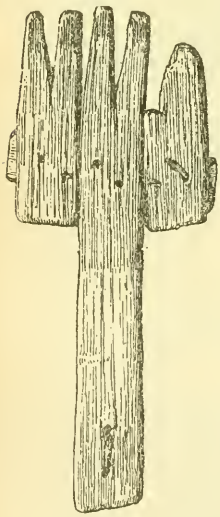


FIG. 218.—PLUMES ON BIRD PAHO FROM SILVER CITY, NEW MEXICO.

A plume or bird paho from a cave near Silver City, New Mexico, collected by Henry and James K. Metcalf, consists of strips of thin wood sewed to a crosspiece (fig. 218), the central strip forming the support. The colors used in decorating this object are red on the body and the tips of the feathers blue. This paho appears to represent a feather plume or bird like that shown in figures 5 and 6, plate 22, but ruder in conception and execution. (Cat. No. 35263, U.S.N.M.; length, 6 inches; width, 2⅝ inches.)

Another instructive paho from the same locality is formed of thin, soft strips cut from the flower stalk of dasylirion and a disk of gourd joined together with a sewing of fiber cord. (Figs. 219, 220.) The disk is painted red and the strips of wood green and white. Remains of cord at the lower por-

tion of the handle show that the paho was attached to a more complicated structure, probably a headdress. The object probably represents a sun shield with feathers, familiar in Hopi symbolism. (Cat. No. 35264, U.S.N.M.; length, 9¼ inches; width, 4¾ inches.) A small joined wood shield or flower painted green and white is shown in figure 221.

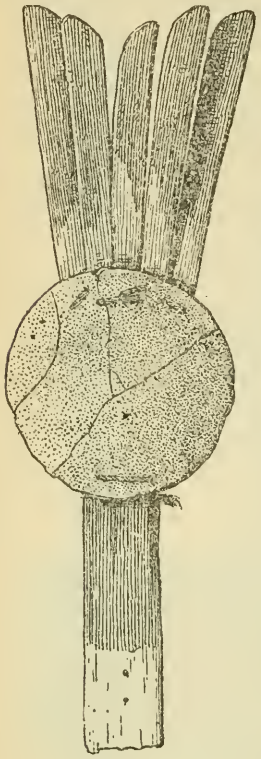


FIG. 219.—PLUMES ON BIRD PAHO FROM SILVER CITY, NEW MEXICO.

Parts of these bird figures of jointed wood are shown in figures 1 to 4 and 8, plate 22, and probably figures 7 and 9, of sewed tablets, are incomplete figures. Figure 10 appears to be a feather. Figures 5 and 6 represent plume pahos, or possibly a rude conception of a bird. The long tablet to the right (fig. 11) appears to bear bird symbolism. It is a thin strip split from yucca or dasylirion flower stalk, smoothed and painted red and having a zigzag design in black or green at three equal intervals of the strip. The upper end is perforated for attachment, and a portion of the cord still remains. The lower end is formed into a taillike shape. (Cat. No. 246577, U.S.N.M.; length, 32 inches; width, 1 inch.)

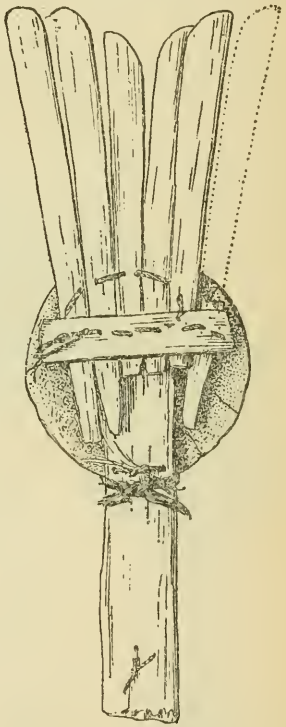


FIG. 220.—PLUMES ON BIRD PAHO FROM SILVER CITY, NEW MEXICO.

Figure 10 on plate 26 is a bird figure and 11 to 14, 16, 19, and 20 appear to represent feathers.

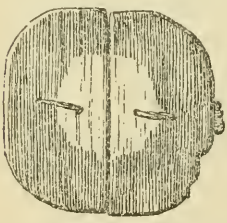
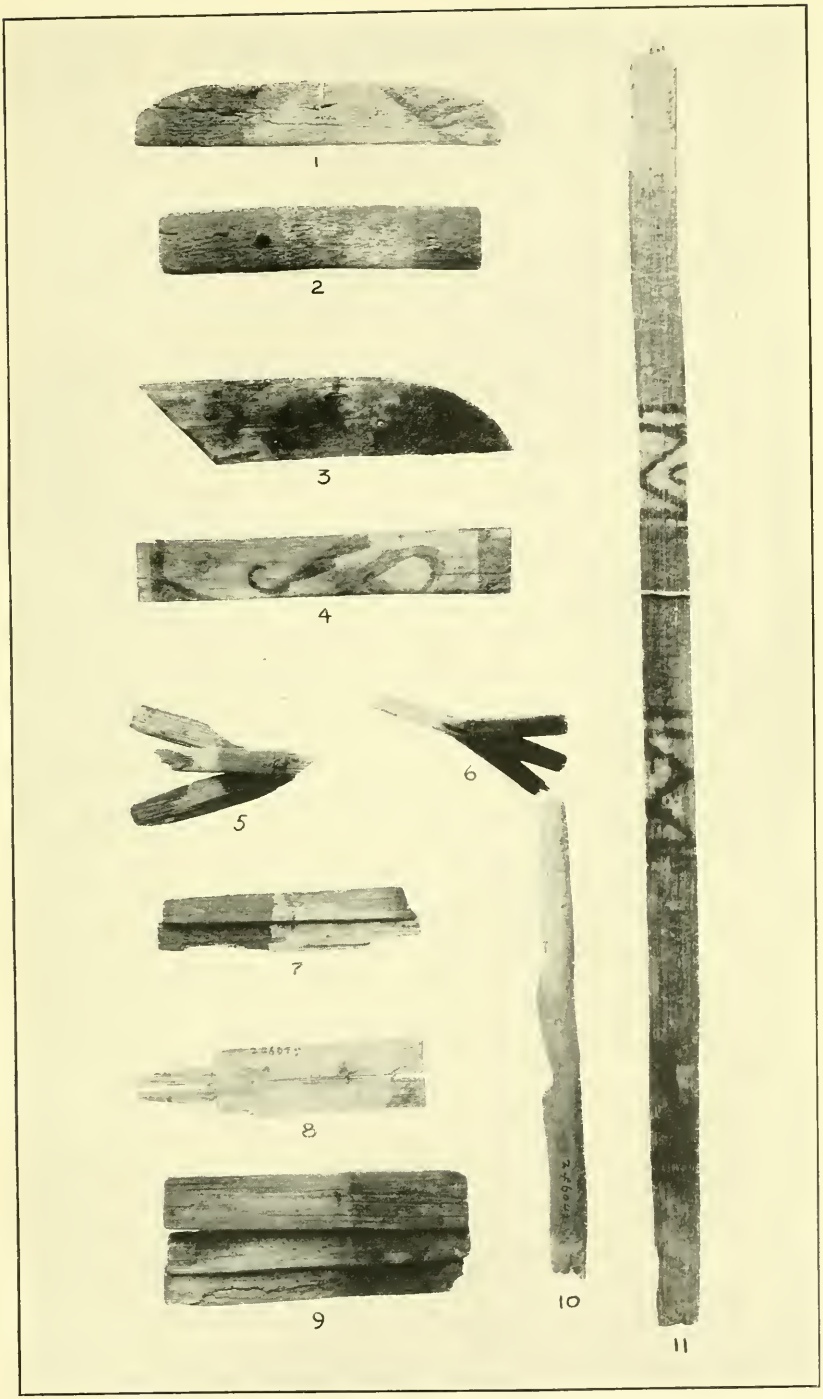


FIG. 221.—DISK OF PAINTED WOOD FROM BEAR CREEK CAVE.

### FIRE PAHOS.

It is apparent to anyone familiar with the archeology of the ancient Pueblos that the cult of fire was of very great significance. Every grave that is opened shows that ashes and charcoal had an important part in mortuary rites and gives evidence that a grave fire was a feature of early burials. The burial of infants under or near the hearth was a common method of interment,



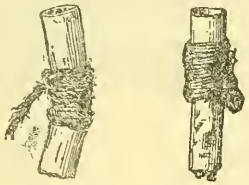

PAINTED WOODEN STRIPS FROM BEAR CREEK CAVE.

FOR EXPLANATION OF PLATE SEE PAGE 106.

and a cemetery near a ruin at the Cienaga on the Spur Ranch, Luna, New Mexico, appears to have been set apart for this purpose. It is located in front of the pueblo near the walls, and at intervals hard burnt clay fireplaces with bosses set triangularly were placed among the graves.[1] Cremation was not practiced in the region explored, but on the Gila it was common. It was noticed in the pit shrines of the Bear Creek Cave that many of the offerings had been burnt and that offerings in the form of bundles of painted rods, perhaps torches, showed marks of fire. If it was the custom of the ancient people of Blue River to burn offerings, the custom has not, so far as known, been perpetuated among the Pueblos.

FIG. 222.—CEREMONIAL CIGARETTE FROM BEAR CREEK CAVE.

The offering of smoke in connection with the placing of objects in shrines, however, is indicated. Innumerable cigarettes of reed stuffed with herbs were offered, in most cases showing no traces of fire but in several places reed cigarettes burnt at the end were observed. The stone tubes or cloudblowers whose purpose was for emitting a cloud of smoke incense are rarely found in the dry caves, but in the open-air ruins, and the cigarette is perhaps its substitute as an offering. Firesticks themselves, invested with a sacred character, were, after being worn out, placed away carefully and were apparently in some case offered in shrines. (See pl. 15.)

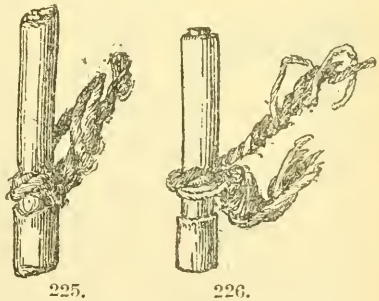


223. 224.

FIGS. 223, 224.—CEREMONIAL CIGARETTES FROM BEAR CREEK CAVE.

CEREMONIAL CIGARETTES.

These are sections of arrow reed cut near the septum, and they are among the most frequent offerings that meet the eye in the ceremonial caves. They are filled tightly with fragments of aromatic herbs, such as artemisia, and other plants not determined. When perfect, these cigarettes have wrappings of cotton, simple wrappings, as in figures 222 to 224, or complicated and of several different colors



225. 226.

FIGS. 225, 226.—CEREMONIAL CIGARETTES FROM BEAR CREEK CAVE.

[1] Antiquities of the Upper Gila and Salt River Valleys, Bulletin 35, Bur. Amer. Ethnology. Washington, 1907, fig. 28, p. 64.

of cord, as in figures 225 to 230. The prevailing color of the cord is red. In cigarettes from a cave near Phoenix, Arizona, these wrapping are replaced with a woven band of white cotton. (Fig. 231.) Some of these cigarettes have cords by which they were attached to other offerings, as bows (figs. 232, 233), and to pahos. (See pl. 18.) Sometimes a large and small cigarette or two of equal size are tied together, conveying some idea of the worshiper. (Figs. 234–236.) At other times three and four are bound together (figs. 237, 238), and in one specimen from a cave near Phoenix, Arizona, four of these cigarettes are bound together with cotton cord and held securely by a coarse wrapping between the pairs of tubes. (Figs. 239–240.) The offerings appear to refer to the four world quarter idea—that is, the regions between the cardinal points which are assigned to nature gods, natural phenomenon, and life. (Cat. No. 263195, U.S.N.M., collected by F. E. Cooley.)

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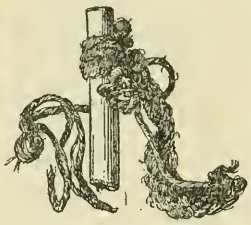

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FIGS. 227, 228.—CEREMONIAL CIGARETTES FROM BEAR CREEK CAVE.

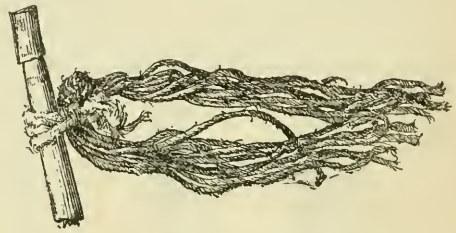


FIG. 229.—CEREMONIAL CIGARETTE FROM BEAR CREEK CAVE.

Compound cigarettes are not often encountered, but small cigarettes occur in myriads, evidently being offerings of general import, possibly to the god of fire. In the Tularosa Cave a number of these cigarettes have been burned. They were pierced, also, through the septum, apparently for the purpose of smoking, as was the custom in ancient Mexico. The contents of these cigarettes burn with a pleasant odor, and there is no question but that they were symbolic of offerings of incense.[1]

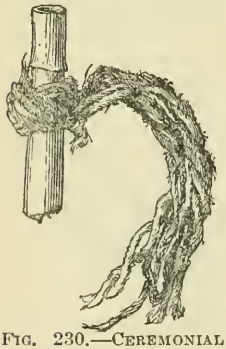
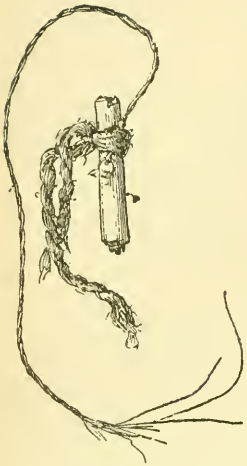


FIG. 230.—CEREMONIAL CIGARETTE FROM BEAR CREEK CAVE.

FIG. 231.—CEREMONIAL CIGARETTE FROM PHOENIX, ARIZONA.

Another class of these reed offerings is much larger, and instead of being wrapped with cord a string of beads or a bit of shell orna-

[1] Censers and Incense of Mexico and Central America, Proc. U. S. Nat. Mus., vol. 42, pp. 109–137, with pls. 3–14, published Apr. 17, 1912.



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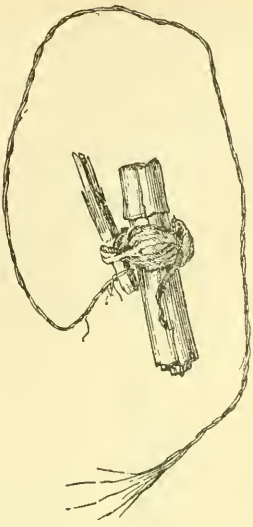

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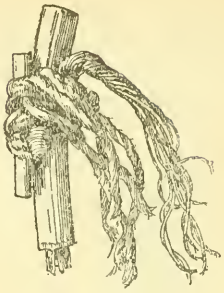

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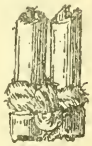

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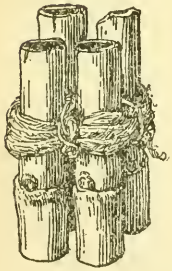

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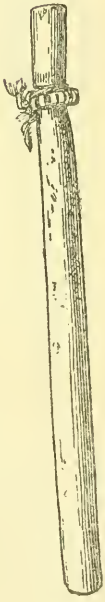
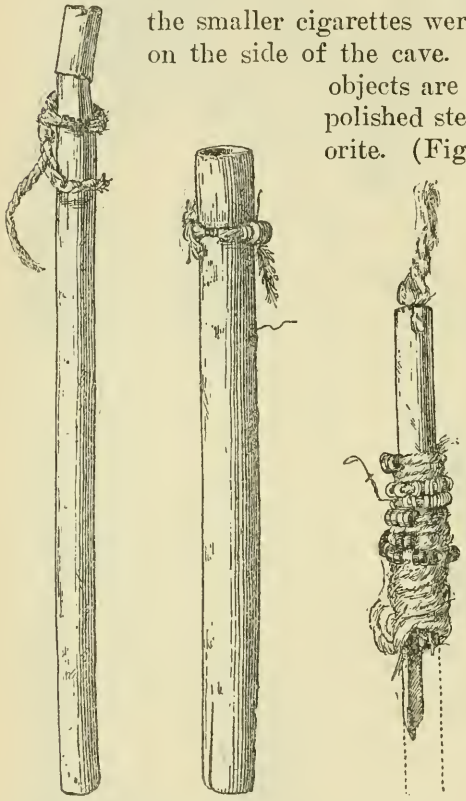


242.

FIG. 232.—CEREMONIAL CIGARETTE FROM BEAR CREEK CAVE.
FIG. 233.—CEREMONIAL CIGARETTE ON A BOW FROM BEAR CREEK CAVE.
FIGS. 234–236.—CEREMONIAL CIGARETTES, DOUBLE, FROM BEAR CREEK CAVE.
FIG. 237.—CEREMONIAL CIGARETTE, QUADRUPLE, FROM BEAR CREEK CAVE.
FIG. 238.—CEREMONIAL CIGARETTE, TRIPLE, FROM BEAR CREEK CAVE.
FIGS. 239, 240.—CEREMONIAL CIGARETTES, QUADRUPLE, FROM PHOENIX, ARIZONA.
FIGS. 241, 242.—CEREMONIAL CIGARETTES WITH BEAD OFFERING FROM BEAR CREEK CAVE.

ment is bound around them near the septum. (Figs. 241–244.) At present they are rarely found to contain the sacred herbs. This is probably due to the fact that the tubes are larger and the material has fallen out in the course of time. Another suggestion is that these tubes might have been offered as flutes. The larger tubes are found in the inner recesses of the cave, while the smaller cigarettes were deposited in definite shrines on the side of the cave. The beads surrounding these objects are very fine, and consist of black polished steatite, white limestone, and fluorite. (Fig. 245.)



243. 244. 245.

FIGS. 243–245.—CEREMONIAL CIGARETTES WITH BEAD OFFERING FROM BEAR CREEK CAVE.

FIRE STICKS AND TORCH OFFERINGS.

A number of worn-out fire drills and hearths were found in the débris of this and other caves. (See Pl. 15.)

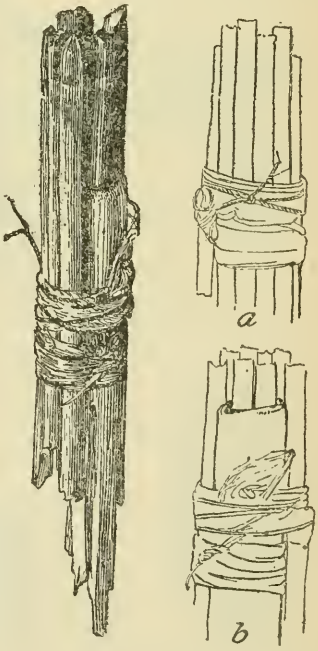



FIG. 246.—TORCH OF RODS FROM BEAR CREEK CAVE.

It is probable that when of no further service this apparatus was laid aside as being entitled to certain respect and veneration. It is also probable that fire sticks were kept on hand to be used at the time of the offerings in Bear Creek Cave, as spoken of previously, and that in making the offerings the fire was set to a bunch of painted rods forming a torch. Figure 246 *a*, *b*, shows details of construction. This bundle of rods is painted red and white and is wrapped together with yucca and cotton around a yucca flower stalk. Two of the rods are in-

closed in the hollow stalk. The rods are burnt off at one end, and the bundle was found in place in a shrine, where it had been deposited. It is 5 inches in length. (Cat. No. 232202, U.S.N.M.).

### CLOUD BLOWERS.

These are stone tubes from small to large size used for blowing a cloud of smoke incense in ceremonies. The smaller specimens, usually of hard material, have been called pipes, but there is really no discrimination as to use between them and the large cloud blowers, and the name is only retained for convenience of description. Concerning their use, Dr. J. Walter Fewkes says:

FIG. 247.—PIPE IN PROCESS FROM TULAROSA CAVE.

> The Indians of Tusayan smoke the leaves of various plants and use various mixtures in their religious rites. In these rites the one who controls the pipe, and who is an important functionary, must light it and immediately hand it to the chief, friendly words being exchanged between the two. The chief blows from his mouth the smoke which he has inhaled toward the four cardinal points, north, south, east, west, upward, downward, and over the altar. They believe that the smoke is the cloud symbolized by it; and the ceremonies in which they smoke have some secret relation to the offerings made to the gods of rain. They use the utmost care in making the mixtures of tobacco which are to serve for this sacred purpose, and the pipe must be lit with the fire produced in the manner prescribed by the rite. Every ceremony and council meeting of chiefs begins and ends with this brotherly smoking.[1]

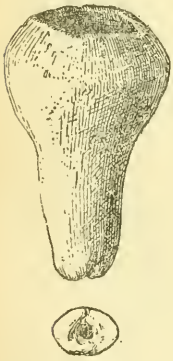


FIG. 248.—PIPE OF POTTERY FROM SPUR RANCH.

The small tubular pipe is rarely met with in this region, in marked contrast with the number found in northern Arizona and New Mexico. It would appear that in the South, the place of the pipe is taken by the cigarette, whose use was prevalent in Mexico from ancient times, and whose range in the United States appears to be local to the Pueblo region. Of the present tribes the Zuñi alone perpetuate the reed cigarette, and they are also unique in not using pipes in ceremonies.

A pipe in process of manufacture is of coarse-grained, gray, hard, volcanic stone worked into cylindrical form and drilled through a portion of its length. (Fig. 247.) This specimen is shaped like those found in the Petrified Forest region of Arizona, a type which is rare here. (Cat. No. 246472, U.S.N.M. Diameter, $\frac{7}{8}$ inch; length, $1\frac{7}{8}$ inches. Tularosa Cave.) Another small pottery object resembling a pipe is from the Spur Ranch. It measures $\frac{3}{4}$ inch in diameter and $1\frac{3}{4}$ inches long. (Fig. 248, Cat. No. 231991, U.S.N.M.)

[1] Report of the United States commission to the Columbian Historical Exposition at Madrid, 1892–93. With special papers. Washington, 1895, p. 283.

A pipe or small cloud blower made from altered serpentine, the exterior polished and the interior bored out with a flint drill is shown in figure 249. Judging from the bore the stone was difficult to work. The lower portion of the tube is ground off diagonally on account of fracture of the stone, or from preference. (Cat. No. 170535, U.S.N.M. Diameter, 1 inch; length, 2 inches. Tularosa River, New Mexico. Collected by Henry Hales.) Another small cloud blower is made of fine tufa, the surface smoothly finished and bearing traces of paint. The specimen is unfinished. A hole is drilled in the lip near the orifice. (Fig. 250, Cat. No. 170534, U.S.N.M. Diameter, 1¼ inches; length, 2⅜ inches. Tularosa River, New Mexico. Collected by Henry Hales.)

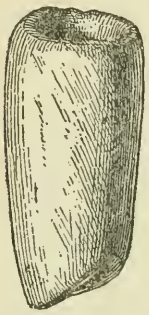


FIG. 249.—PIPE OF SERPENTINE FROM TULAROSA RIVER.

Among the objects whose manufacture requires more than ordinary skill are the large tubes of stone which are called cloud blowers. Although made of comparatively soft material, usually tuff, they must have entailed a great deal of patient labor, especially in driving the central orifice through the tube. In some cases this was accomplished by repeated thrusts with a stone implement, the specimen showing on the interior many scorings. In many smaller tubes the boring was accomplished, apparently, with a large stick and sand.

FIG. 250.—SMALL CLOUD BLOWER FROM TULAROSA RIVER.

Cloud blowers are usually large and are of two forms, one having a shoulder cut around it at the upper third, and tapering from thence to the orifice; the other has a raised band around the upper portion, or a groove takes the place of the band. They vary in length from 4 to 14 inches.

FIG. 251.—SMALL CLOUD BLOWER FROM SPRINGERVILLE, ARIZONA.

Some years ago a cloud blower of excellent shape was found in a cave 25 miles west of Springerville, Arizona, by E. W. Nelson. It is worked from coarse yellow-brown tufa, and finished as carefully as the material allows (fig. 251), and is discolored somewhat at the base and on the interior. The base has been worked out with a sharp stone tool by way of the larger end. The specimen may be regarded as the typical form of cloud blower. (Cat. No. 97734, U.S.N.M. Length, 4¼ inches; diameter, 2½ inches.)

The longest specimen (fig. 252) is from the Upper San Francisco River. It measures 13¾ inches in length and 2¾ inches in diameter, but perhaps an inch has broken away from the upper end. The material is tufa, and the exterior smoothly finished. No traces of paint remain, but no

doubt the specimen was originally decorated and repainted each time it was used in ceremony, following the usages of the present Pueblos as to cult objects. This fine specimen was collected by E. W. Nelson. (Cat. No. 98228, U.S.N.M.)

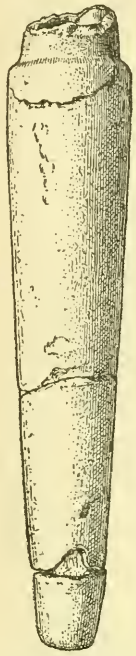


FIG. 252.—CLOUD BLOWER FROM UPPER SAN FRANCISCO RIVER.

FIG. 253.—CLOUD BLOWER FROM BLUE.

Another cloud blower of this type is of brown tufa and is in good preservation. (Fig. 253.) It was found in the Martin ruin at Blue, Arizona.

FIG. 254.—CLOUD BLOWER FROM UPPER SAN FRANCISCO RIVER.

FIG. 255.—CLOUD BLOWER FROM ARIZONA.

(Cat. No. 596, Gates collection. Diameter, 2¼ inches; length, 6½ inches.) One of tufa (fig. 254) has a shorter terminal than usual. The specimen is well finished. (Collected at Alma, New Mexico, by E. W. Nelson. Cat. No. 109794, U.S.N.M. Diameter, 2⅜ inches; length, 5¼ inches.) A specimen of excellent form (fig. 255) is also of tufa. Its exact locality is not known but it belongs with the specimens described. (Cat. No. 216172, U.S.N.M. Arizona. Collected by C. A. Deane.) A rude specimen of tufa, painted red, is constricted at the upper end (fig. 256) apparently combining the collar and groove. (Cat. No. 231902, U.S.N.M. Spur Ranch, Luna, New Mexico. Diameter, 2½ inches; length, 5 inches.) A plain specimen of large diameter of tufa, painted red, is shown in figure 257. (Cat. No. 98226, U.S.N.M. Upper San Francisco River, New Mexico. Collected by E. W. Nelson. Diameter, 3¼ inches; length, 8 inches.) A large specimen of the collar type was found in a ceremonial room of the Spur Ranch ruin. It is of coarse tufa and was painted red. (Fig. 258.) Only half of the

FIG. 256.—CLOUD BLOWER FROM SPUR RANCH.

FIG. 257.—CLOUD BLOWER FROM UPPER SAN FRANCISCO RIVER.

specimen remains. (Cat. No. 231904, U.S.N.M. Diameter, 4 inches; length, 8¾ inches.)

An unusual cloud blower made of fine grained yellow tufa smoothly finished on the exterior, and painted red-brown, and striped with darker brown (fig. 259), has the interior hollowed out by vertical gouging and working with a sharp stone tool from either end producing an hourglass-shaped cavity. Midway between the top and bottom of the specimen a hole has been drilled through the wall of the pipe (*a*), and near the lower margin a series of 5 holes have been drilled, which it is suggested were intended to promote the draught of the blower. It appears, therefore, that this blower was not used in the customary way by ejecting the smoke with the breath, but that it was set upright on the ground or some support and the herbs thrown in on the charcoal, the smoke naturally rising through the holes. Near the upper edge a groove has been cut around the blower for the passage of a cord to which feathers may have been attached. The cloud blower was found with other ceremonial objects in a large room of the great ruin near the Spur Ranch house of Montague Stevens, near Luna, New Mexico. (Cat. No. 231903, U.S.N.M. Length, 5 inches; upper diameter, 2¾; lower diameter, 1⅝ inches.)

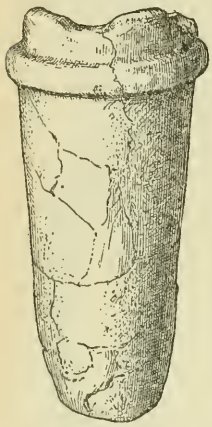


FIG. 258.—CLOUD BLOWER FROM SPUR RANCH.

COSTUME PAHOS.

In the Bear Creek shrines there were many bundles of cord which are evidently parts of costume worn about the loins like the two bark skirts, front and back, worn by the Mohave, Cocopa, and other far southwestern tribes within 30 years. Plate 23, figure 1, consists of a bundle of red cords (outside) and a bundle of black cords (inside) secured at the bend with a thick red cotton cord. (Cat. No. 232161, U.S.N.M., Bear Creek Cave.) Figure 2 consists of a bundle of red-brown cord tied at the bend with a red cotton cord which is shown at the right. (Cat. No. 232160, U.S.N.M., Bear Creek Cave.)

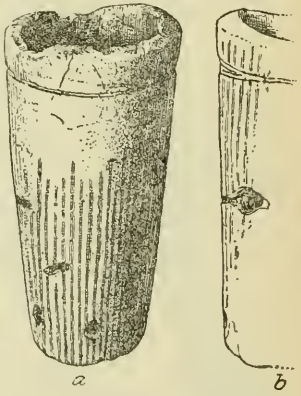
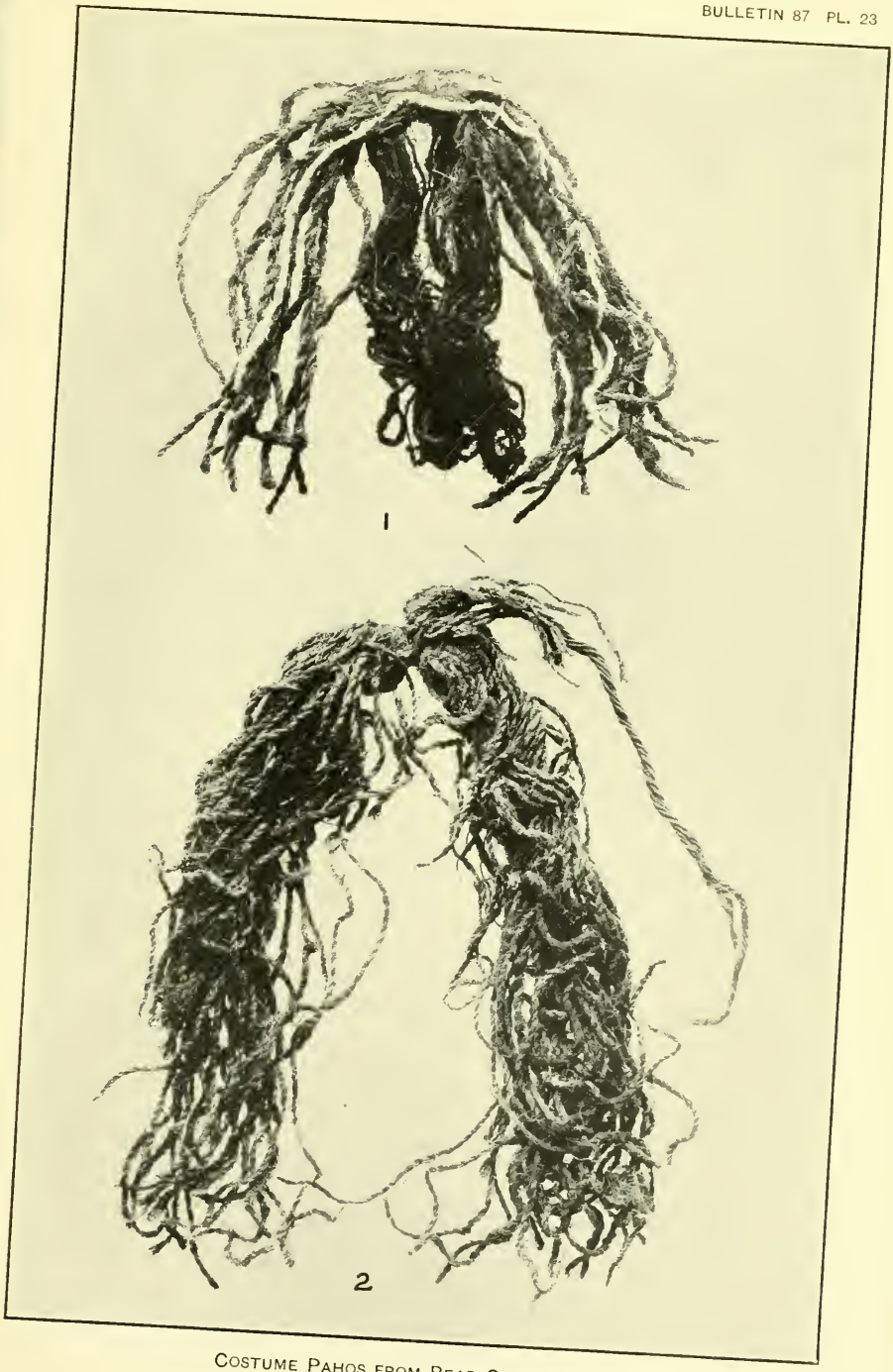



FIG. 259.—CLOUD BLOWER FROM SPUR RANCH.

In respect to other offerings of costume there were found in Bear Creek Cave a few sandals, but these were of the usual size, had been




COSTUME PAHOS FROM BEAR CREEK CAVE.

FOR EXPLANATION OF PLATE SEE PAGE 114.

much worn and were probably cast away by the worshipers. The textiles of which only fragments remained were parts of costume also cast away. J. H. Cosper, who lives near Bear Creek, informs me that about 1904 a school-teacher removed from the cave a cotton towel, as he describes it, which was probably a woman's apron.

### POTTERY FIGURINES.

There occur in the ruins of the Gila-Salt region and also other ancient Pueblo localities, small, rude, pottery figurines of animals, and these are in sufficient number to give rise to the belief that they are not mere children's toys or crude efforts of the small potter. The difficulty of explaining their intent is much increased by the absence of such objects in graves, shrines, caves (except Tularosa, an inhabited cave), ceremonial rooms, etc., and their prevalence in the filled-in areas around open-air villages. They represent several species of animals, are usually perforated longitudinally, and are generally in a fragmentary condition. None shows traces of pigment, but some of them (fig. 264), are marked with incisions indicating the pelage of the animal. The perforation would indicate that they were strung and were perhaps worn as a fetish. Other suggestions are that they were in part attachments to vessels as handles, a feature somewhat common in the western part of the Pueblo region, or they were designed as offerings for the increase of animals like those used by the Hopi in the Soyaluna ceremony and by the Acoma at the feast of St. Stephen, etc.

A list of these objects follows:

Figure 260, Cat. No. 246527. Tularosa Cave, New Mexico.

Figure 261, Cat. No. 245962. Luna, New Mexico.

Figure 262, Cat. No. 245966. Luna.

Figure 263, Cat. No. 245967. Luna.

Figure 264, Cat. No. 231906. Spur Ranch.

Figure 265, Cat. No. 231908. Luna.

Figure 266, Cat. No. 232007. Luna.

Figure 267, Cat. No. 232006. Cienaga ruin, Spur Ranch, Luna, New Mexico.

Figure 268, Cat. No. 231907. Spur Ranch.

Figures 269, 270, Cat. No. 231929 *a* and *b*. Spur Ranch.

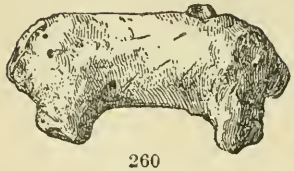
Figure 271, Cat. No. 231820. Spur Ranch.

Figure 272, Cat. No. 232006. Luna.

Figure 273, Cat. No. 231929. Spur Ranch.

Figure 274, Cat. No. 231930. Luna, and

Figure 275, Cat. No. 245968. Luna.



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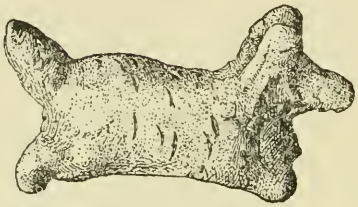
263.



264.

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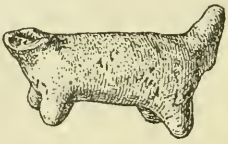
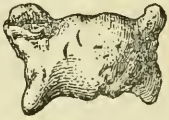
266.



267.



268.

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271.

272.

273.

274.

275.

FIG. 260.—POTTERY FIGURINE FROM TULAROSA CAVE.
FIGS. 261–263.—POTTERY FIGURINES FROM LUNA, NEW MEXICO.
FIG. 264.—POTTERY FIGURINE FROM SPUR RANCH.
FIGS. 265, 266.—POTTERY FIGURINES FROM LUNA, NEW MEXICO.
FIGS. 267–271.—POTTERY FIGURINES FROM SPUR RANCH.
FIG. 272.—POTTERY FIGURINE FROM LUNA, NEW MEXICO.
FIG. 273.—POTTERY FIGURINE FROM SPUR RANCH.
FIGS. 274, 275.—POTTERY FIGURINES FROM LUNA, NEW MEXICO.

The specimen, figure 264, appears to represent a dog, and others in the group probably have the same original. Pottery figurines undoubtedly of this animal, executed with considerable spirit, were taken from the ancient Hopi ruins in the Jettyto Valley by the writer.[1]

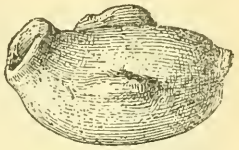


FIG. 276.—POTTERY FIGURINE FROM SPUR RANCH.

Bird figurines are invariably made to represent a hollow vessel (fig. 276, Cat. No. 231915, U.S.N.M.), and probably have a different purpose from the figurines described. The figure represents a duck, and may have either been used as an offering or to contain some sacred substance used in cult. (Length, 2½ inches; width, 1⅝ inches; height, 1¼ inches. Spur Ranch, Luna, New Mexico.) What appears to be a hand figurine was found in Tularosa Cave (fig. 277, Cat. No. 246526, U.S.N.M.), and its possible connection with the hand censer of Mexico may be suggested.

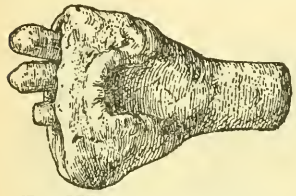


FIG. 277.—POTTERY FIGURINE FROM TULAROSA CAVE.

SPRING PAHOS.

In clearing out springs the settlers of the Southwest have often found small pottery, beads, shells, etc., in the débris, showing that the custom of offering to springs had been quite common among the Pueblo Indians. Studies made of the present Pueblos indicate that the custom is still kept up, and the spring worship is known to be very important now as it was in ancient times. The usual offering, or the commonest offering, that has, from its durability, come down to us is of pottery, and from some springs, like that noble fountain which is the source of Apache Creek in the Gallo Mountains, great quantities of miniature vessels have been taken. These were ordinarily very rudely formed, only suggestive of the domestic vessels (figs. 278–284), and among these are squared forms, as in figure 280, which do not occur in the pottery of the region. Coiled vessels (fig. 284) and vessels showing obscure coiling lines (figs. 285, 286) occur. Sometimes well-finished vessels of ordinary size (fig. 287, Cat. No. 245787, U.S.N.M., 3 inches high, of polished red-brown ware) were deposited, no doubt from the nearer villages, from which transportation would be easy. Pahos were no doubt placed in the water, but these perishable offerings soon disappeared. Larger objects of wood, in the form of a snake, have

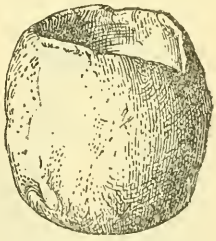


FIG. 278.—POTTERY OFFERING FROM GALLO SPRING.

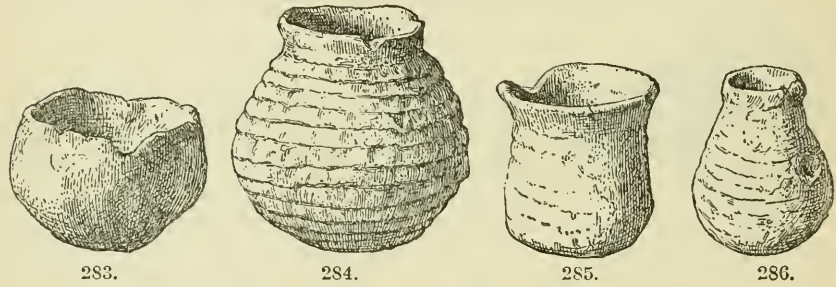
[1] Rep. U. S. Nat. Mus., 1901, pl. 96.

sometimes survived. It is probable that the beads found in the sands of springs were thrown in with the offerings. The spring worship is a part of the general attitude held by the Pueblo Indians toward water in its several forms.[1]

FIGS. 279–282.—POTTERY OFFERINGS FROM GALLO SPRING.

MOUNTAIN PAHOS.

The mountain worship, like the spring worship, has a continuous history from ancient times, and it is possible that the sites of the




FIGS. 283–285.—POTTERY OFFERINGS FROM GALLO SPRING.
FIG. 286.—POTTERY OFFERING FROM BEAR CREEK CAVE.

present shrines have been in use for many centuries. Some of the shrines have accumulations of pottery or beads which would represent the gradual accretions of a long period. The origin of this form of religious observance is thought to be connected with sky worship; that is, the worship of beings who can be approached on the heights. The Pueblos generally, however, perceive the connection of mountains with cloud formation and precipitation and venerate them as sources of water. The Hopi, for instance, call the San Francisco Mountains "Nuvatikiobi," the abode of the snow, and believe it to be the house of certain cachinas. From this triple mountain, which is in sight from a number of villages, the Hopi can see the

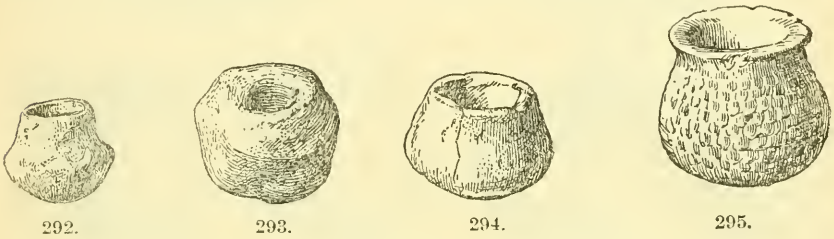
FIG. 287.—POTTERY OFFERING FROM GALLO SPRING.

[1] Sacred Springs in the Southwest, Records of the Past, vol. 5, pt. 6, June, 1906, pp. 163–169.

storms progress toward their fields many miles away and which may water their crops. On the east also a mountain sends out great masses of cumuli, which float above the villages in August. It is possible,

FIGS. 288, 289.—POTTERY OFFERINGS FROM APACHE CREEK.
FIG. 290.—POTTERY OFFERING FROM LUNA, NEW MEXICO.
FIG. 291.—POTTERY OFFERING FROM SPUR RANCH.

therefore, that the mountain worship is a part of water worship. The small pottery frequently found on the village sites is the same as




FIGS. 292–295.—POTTERY OFFERINGS FROM SPUR RANCH.

that deposited in the springs and in caves. Two vessels from Apache Creek (figs. 288 and 289) and several from Spur Ranch and Luna

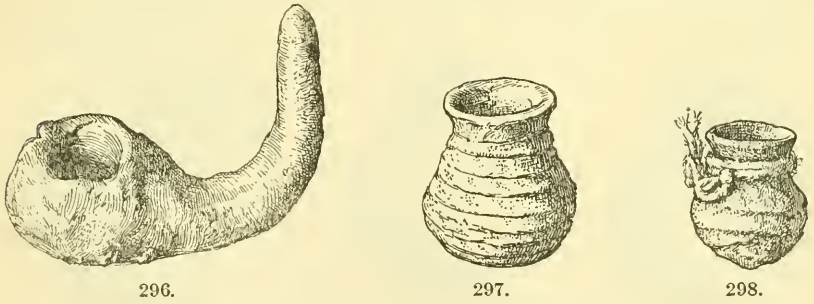



FIG. 296.—POTTERY OFFERING FROM SPUR RANCH.
FIGS. 297, 298.—POTTERY OFFERINGS FROM BEAR CREEK CAVE.

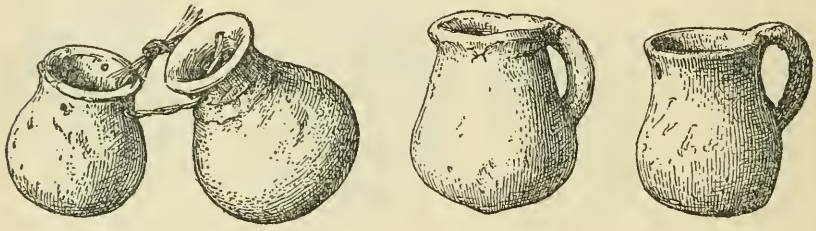
(figs. 290 to 296) illustrate these objects. It must be remembered that the Hopi and other of the modern Pueblos make extended use of small pottery in cult, depositing them in shrines after decorating

them with feathers and filling them with water, meal, or other substances, or these vessels may be used in bringing small quantities of

299. 300. 301. 302.

FIGS. 299–302.—POTTERY OFFERINGS FROM BEAR CREEK CAVE.

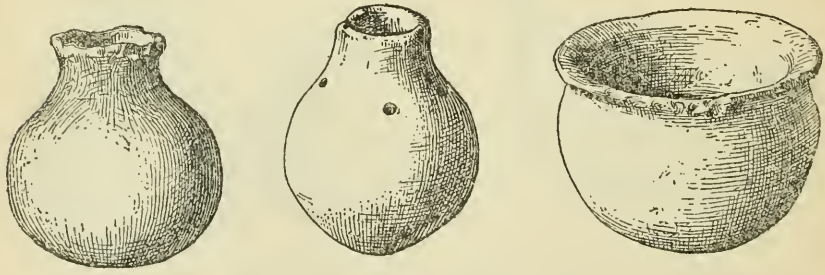
water from sacred springs, etc. The Bear Creek Cave contained numerous small pottery offerings, which had been placed in the pits



303. 304. 305.

FIGS. 303–305.—POTTERY OFFERINGS FROM BEAR CREEK CAVE.

in the floor, together with baskets, cigarettes, pahos, miniature bows and arrows, and other cult objects. The pottery offerings from Bear



306. 307. 308.

FIGS. 306–308.—POTTERY OFFERINGS FROM BEAR CREEK CAVE.

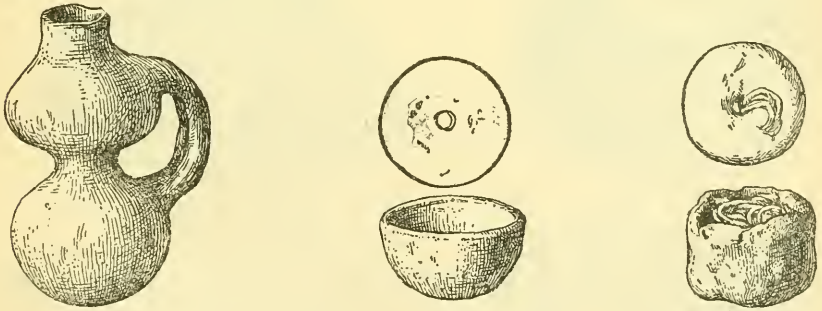
Creek Cave show greater variety and more careful manufacture than those from the springs or village sites. They consist of coiled vases

(fig. 297), sometimes with cotton cord remaining around the neck (fig. 298); coiled vases with handles (figs. 299, 300, and 301); plain vases (fig. 302), sometimes joined in pairs with yucca cord (fig. 303) or with handles (figs. 304 and 305); or larger plain vases (fig. 306), sometimes perforated for attachment of feather cords (fig. 307). There are plain deep bowls (fig. 308), shallow coiled bowls (fig. 309), and occasionally a bowl of deep form with extremely fine coiling. (Fig. 310.) One specimen of the pilgrim jar form with

309. 310.

FIGS. 309, 310.—POTTERY OFFERINGS FROM BEAR CREEK CAVE.

handle was found. (Fig. 311.) Bowls perforated through the bottom, designed for placing on paho sticks, are shown in figs. 312 (outline at top) and 313 (outline at top), the latter having bright-colored cords which were attached to it at the time of offering. An excellent specimen of this form is a small napiform vase of brown ware decorated with waved lines in white pigment mixed with an aqueous medium.

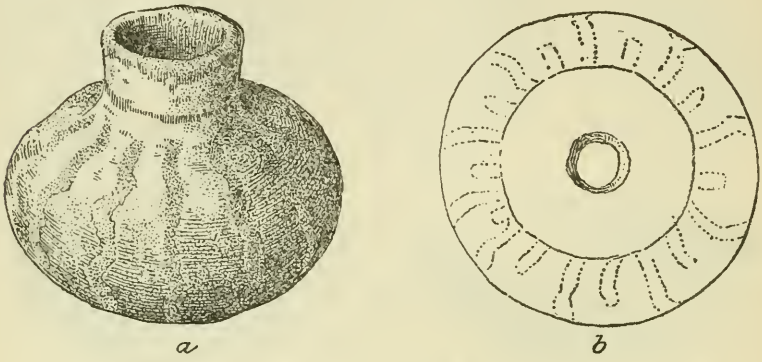


311. 312. 313.

FIGS. 311–313.—POTTERY OFFERINGS FROM BEAR CREEK CAVE.

(Fig. 314 *a*.) The vase has a hole neatly drilled through the middle of the bottom (fig. 314 *b*) by means of which it was drawn on the rod which formed part of the offering. The design probably represents falling rain and the offering relates to a prayer for rain, the vase standing as a symbol of water. The bottom of the vase is painted black. (Cat. No. 232248, U.S.N.M.; diameter, 3 inches; height, 2½ inches.)

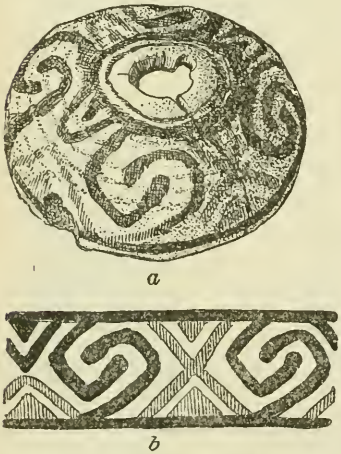
A very interesting offering consists of a miniature coiled bowl of red-brown ware with polychrome decoration in red, white, and black, applied moist on the baked pottery (fig. 135 *a*), the design, birds with interlocking bills and chevrons of still more con-



*a* *b*

FIG. 314.—POTTERY OFFERING WITH PAINTED DESIGN FROM BEAR CREEK CAVE.

ventionalized bird forms. The detail of the design is given in figure 315 *b*. This striking bit of pottery, which evidences the æsthetic taste of its maker, is the first of its kind to be described, and it was not known previously that ancient Pueblo pottery was ever decorated in



*a* *b*

FIG. 315.—POTTERY OFFERING WITH PAINTED DESIGN FROM BEAR CREEK CAVE.

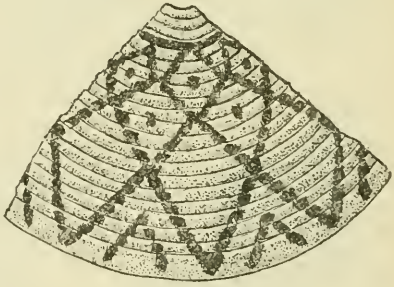
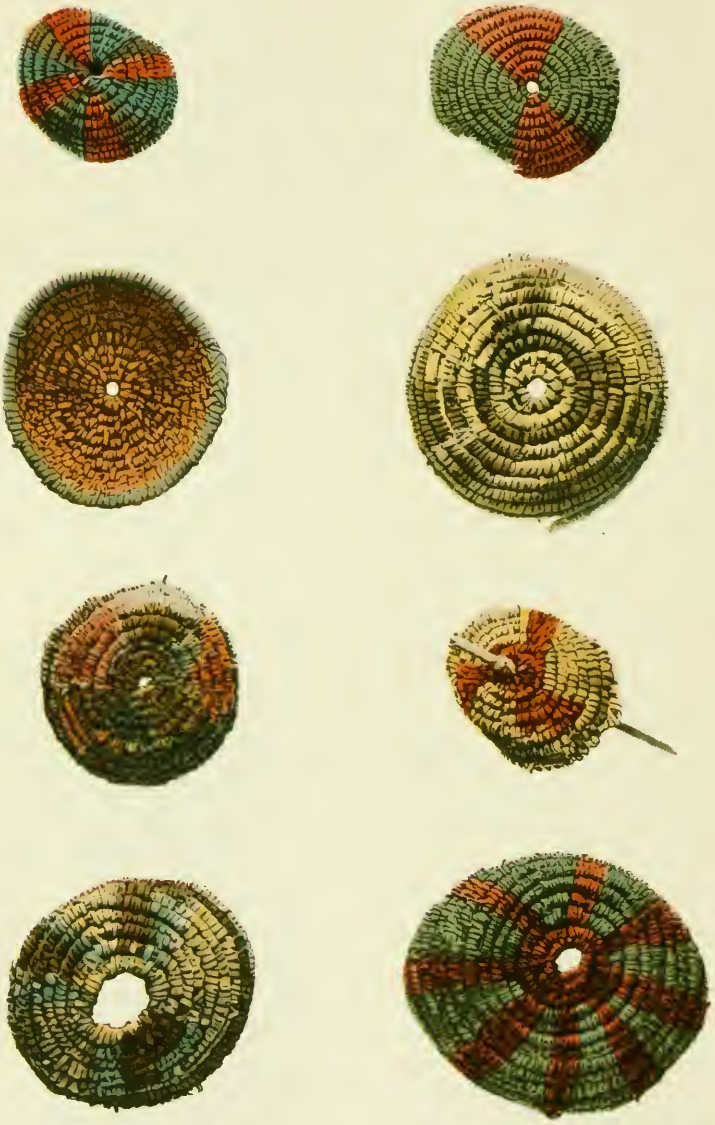


FIG. 316.—DESIGN ON POTTERY OFFERING FROM BEAR CREEK CAVE.

this manner. The hole in the middle of the bottom appears to have been formed at the time the vessel was made. (Cat. No. 232258, U.S.N.M.)

A design on a pottery offering is shown in figure 316. The specimen is of delicate coil, accurately finished red-brown ware decorated in black water color, the design, apparently bird forms, applied in overlapping or puzzle series. This offering was secured to its paho rod as in several preceding figures. (Cat. No. 232259, U.S.N.M.)



COILED PAINTED BASKET PAHOS FROM BEAR CREEK CAVE.

FOR EXPLANATION OF PLATE SEE PAGE 123.

BASKETRY PAHOS.

It is quite evident that baskets were frequently used as mortuary offerings, and they have also an extensive use in connection with ceremonies of the present Pueblos. There is, however, but one instance, so far as I am aware, of miniature baskets being used as offerings, and that is in connection with the toy bows and arrows given to the Zuñi children by the sacred Koko dancers. The numerous basketry offerings found in Bear Creek Cave can scarcely be related to any present customs. The fact, also, that the specimens are painted in different native colors separates them from any similar objects at present among the Pueblos. One of these baskets attached to the paho stick is shown in figure 317, Cat. No. 246138, U.S.N.M. A series of these specimens is shown on plate 24. It will be noticed that all the specimens have holes through the bottom for the stick, although the sticks have disappeared in the course of time.[1] The largest is 4¼ inches in diameter, the smallest 3 inches.

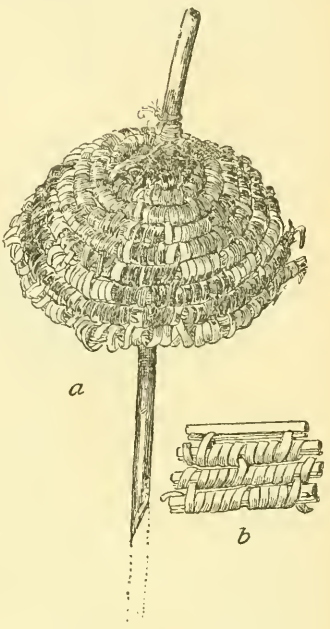



FIG. 317.—BASKET PAHO FROM BEAR CREEK CAVE.

A curious basket paho, shown in figure 318, is made of dasylirion splints by the lapping method, as in the Mohave carrying baskets.

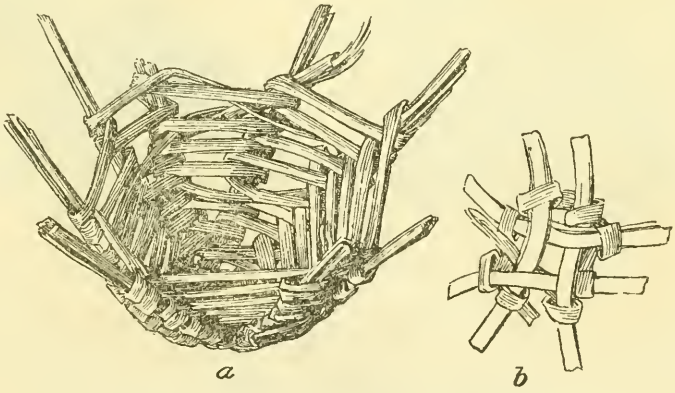



FIG. 318.—BASKET PAHO FROM BEAR CREEK CAVE.

The detail of starting the weaving is shown at *a*. The basket appears to be a model of a carrying frame used among the southern

[1] Catalogue numbers, beginning at the upper left hand of the plate, 236134, 236141, 236133, 236131, 246133, 232089, 246138, 236140.

Arizona tribes. (Cat. No. 232099, U.S.N.M.; diameter, 4½ inches; height, 2¼ inches.)

DESIGNS ON PAINTED BASKET PAHOS.

A number of remarkable painted baskets were found in the shrines on the floor of Bear Creek Cave. They are all coiled and nearly all "lazy stitch" in which the sewing into the succeeding coil is at intervals, the remainder of the coil between the stitches being covered by a winding of the sewing splint.

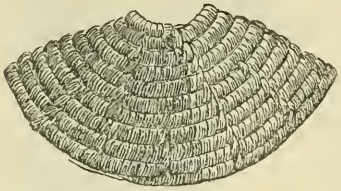


FIG. 319.—DESIGN ON BASKET PAHO FROM BEAR CREEK CAVE.

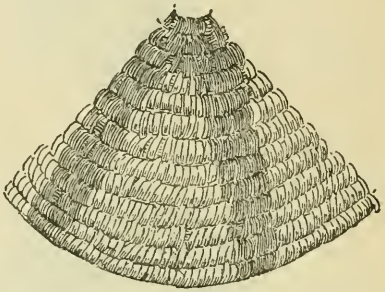


FIG. 320.—DESIGN ON BASKET PAHO FROM BEAR CREEK CAVE.

Professor Mason remarked at the time the baskets were brought to the Museum that heretofore the "lazy stitch" had only been observed in California. Painted baskets also were previous to this time unknown to collectors, although white, frequently, and sometimes blue are applied as a wash to portions of the design of Hopi decorated wicker plaques.

The designs are drawn on the exterior of these paho baskets, and it will be seen that they are intended to be placed on the paho stick

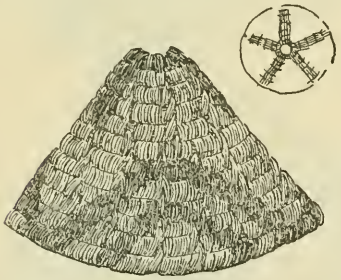


FIG. 321.—DESIGN ON BASKET PAHO FROM BEAR CREEK CAVE.

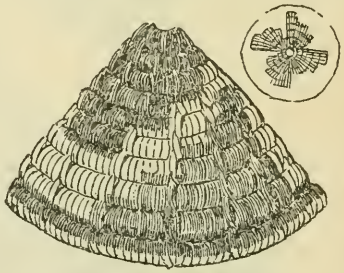


FIG. 322.—DESIGN ON BASKET PAHO FROM BEAR CREEK CAVE.

inverted, almost all of them having a hole in the bottom for the passing through of the rod. The interior of the basket is often covered with a coating of red, or may be left plain.

Figure 319, simple design, formed by covering halves of the basket with red and black.

Figure 320, star design, dividing the basket into segments which field of basket, red. (Cat. No. 246141, U.S.N.M.)

Figure 321, star design in black at apex; wave design at margin; field of basket, red. (Cat. No. 246141, U.S.N.M.)

Figure 322, stepped design in red, black, and plain. Apex design, four-cloud figures in motion. (Cat. No. 246135, U.S.N.M.)

Figure 323, design in black, edged with green and plain; variety of terrace pattern (clouds).

Figure 324, terrace cloud design in black, red, and green and plain splint color. (Cat. No. 246134 U.S.N.M.)

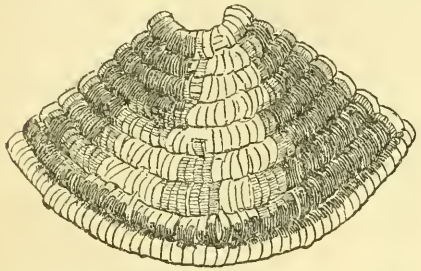


FIG. 323.—DESIGN ON BASKET PAHO FROM BEAR CREEK CAVE.

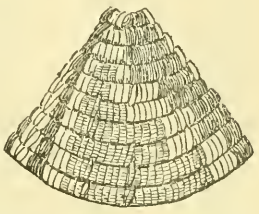


FIG. 324.—DESIGN ON BASKET PAHO FROM BEAR CREEK CAVE.

Figure 325, terrace cloud design in black, red, and splint color. (Cat. No. 232089, U.S.N.M.)

Figure 326, basket regularly sewed with black and straw color splints, and the design which appears to represent stars and clouds shows on the interior. (Cat. No. 246128, U.S.N.M.)

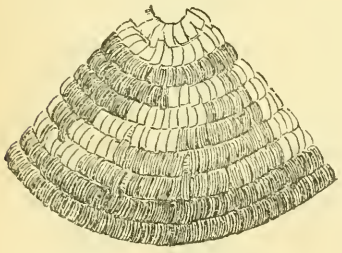


FIG. 325.—DESIGN ON BASKET PAHO FROM BEAR CREEK CAVE.

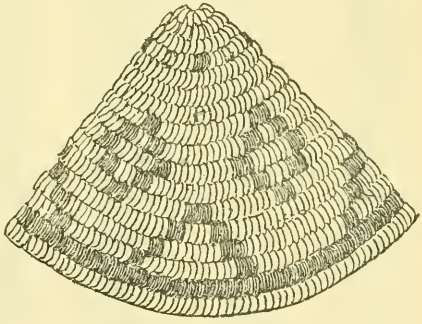


FIG. 326.—DESIGN ON BASKET PAHO FROM BEAR CREEK CAVE.

FLUTE PAHOS.

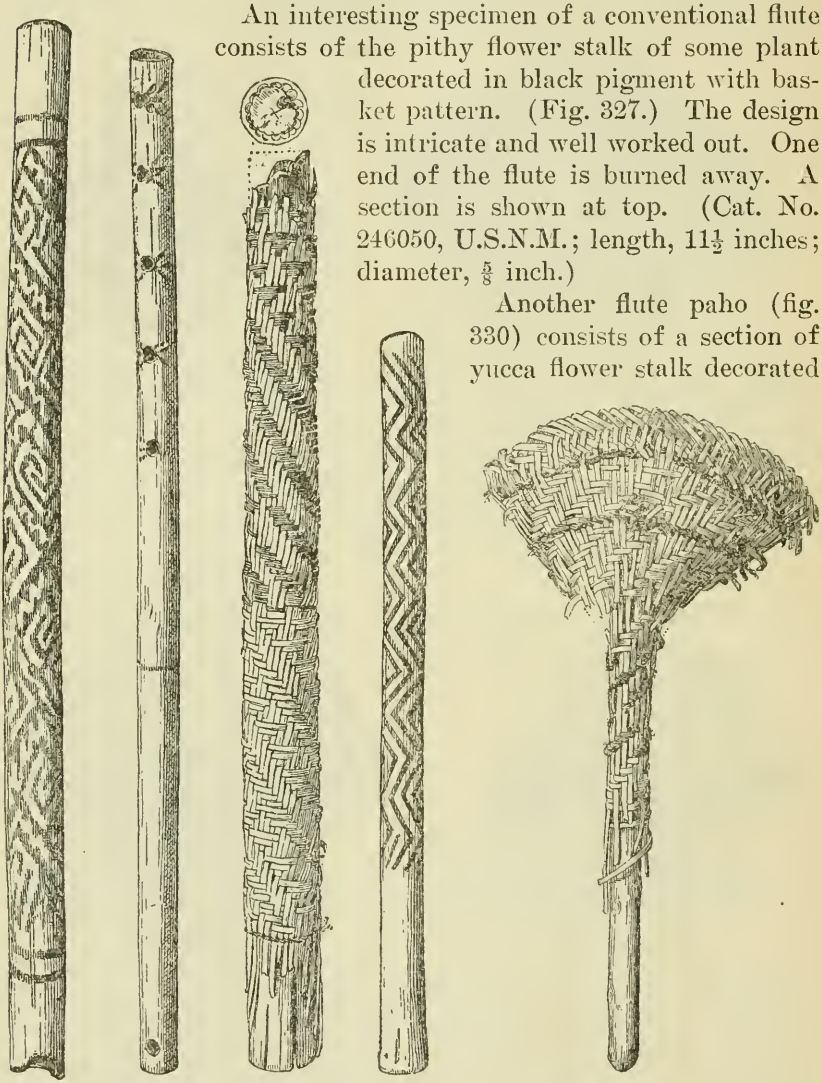
Offerings which evidently represent flutes occur in the Bear Creek Cave. The most perfect specimen (fig. 331) is of basketry, worked by the diaper-twilled method over a wooden rod, and expanded at the upper end to form the bell of the flute. An extra weaving of cord worked in the splints is shown in darker shading in the drawing. (Cat. No. 232092, U.S.N.M.; length, 9¼ inches; diameter of bell, 4½ inches.)

Another specimen (fig. 329) consists of the pithy stem of some plant, overlaid with diaper work of narrow splints in black and natural color. The weaving is very even and the pattern good. The

work was started near the base, where a twining of cord of yucca fiber held the splints in position. The upper end is burnt away and it is not possible to determine whether the flute terminated in a bell. A section is shown at top. (Cat. No. 232093, U.S.N.M.; length, 10½ inches; diameter, ⅞ inch.)

An interesting specimen of a conventional flute consists of the pithy flower stalk of some plant decorated in black pigment with basket pattern. (Fig. 327.) The design is intricate and well worked out. One end of the flute is burned away. A section is shown at top. (Cat. No. 246050, U.S.N.M.; length, 11½ inches; diameter, ⅝ inch.)

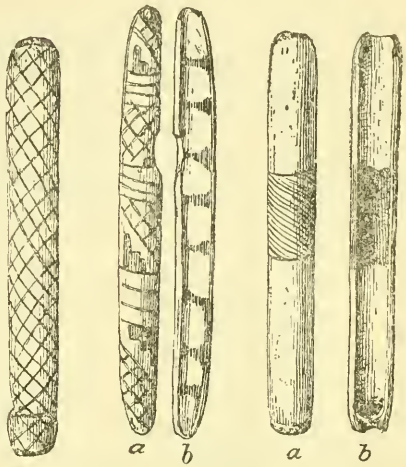
Another flute paho (fig. 330) consists of a section of yucca flower stalk decorated with a basket design in red and black zigzags. (Cat. No. 246050, *a*, U.S.N.M.; length, 12½ inches; diameter, ⅝ inch.)



327. 328. 329. 330. 331.

FIGS. 327, 330.—FLUTE PAHO, PAINTED DESIGN, FROM BEAR CREEK CAVE.
FIG. 328.—FLUTE WITH BURNT ORNAMENT FROM TULAROSA CAVE.
FIGS. 329, 331.—FLUTE PAHOS OF BASKETRY FROM BEAR CREEK CAVE.

From the Tularosa Cave, New Mexico, comes a well-preserved flute made from a joint of reed, the natural septums closing the blowing end, the other end open. (Fig. 328.) It is furnished with five finger holes and a mouth hole, pierced through the walls of the reed by burning. The area around the finger holes bears radiating lines skillfully burnt in and a band around the body of the flute is drawn by the same method. The length of the flute is 10 inches; the diameter $\frac{3}{8}$ inch. (Cat. No. 246363, U.S.N.M.) A similar flute was found in the Bear Creek Cave on Blue River, Arizona. These flutes do not appear to be offerings, but objects of customary use.




FIGS. 332–334.—REED DICE OFFERINGS FROM BEAR CREEK CAVE.

GAME PAHOS.

Games associated with ceremonies are sometimes found among the offerings. Of these the reed dice are most frequent and are interesting illustrations of decoration by methods of engraving, painting, and burning. Figure 332 has the reverse painted black, the obverse engraved; figure 333 *a*, *b* shows the front and back of a die decorated with good design; figure 334 *a*, *b* shows an engraved and painted band on the front and back, respectively. (Cat. No. 246579, U.S.N.M., Bear Creek Cave; length, 3 inches.) An original bundle of cane dice tied with a yucca cord is shown in figure 335 *a* and the obverse and reverse markings produced by burning in the duplicate drawings *bb*, *cc*, and *dd*. The fourth die, *e*, is plain. (Cat.

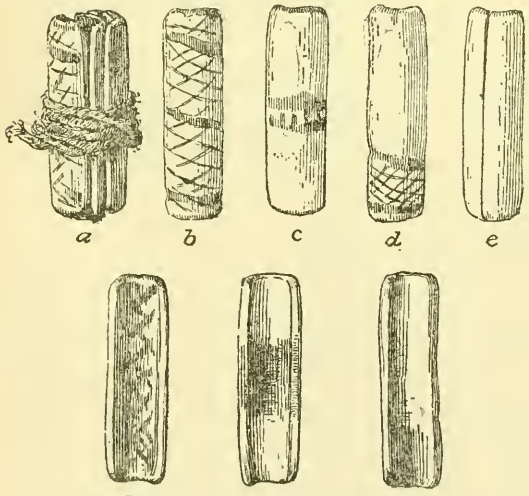



FIG. 335.—REED DICE OFFERINGS FROM TULAROSA CAVE.

No. 246575, U.S.N.M., Bear Creek Cave; length 1⅜ inches.) A set of four cane dice were found at Chevlon, near Winslow, Arizona, in the ruins of a large pueblo, by Dr. J. Walter Fewkes,[1] and also figured by Stewart Culin.[2] All the information available on the subject may be found in the latter report. The lower section of plate 25 shows a set of 13 bone dice (one small die not appearing), the skin bag container and tying string of yucca fiber. The dice have been coated with gray mud on one side and some of these bear scratchings which may be seen under the coating. The specimen was found intact in the débris of Tularosa Cave. The large dice are five-eighths and the smaller three-eighths inch in diameter. (Cat. No. 246361, U.S.N.M.)

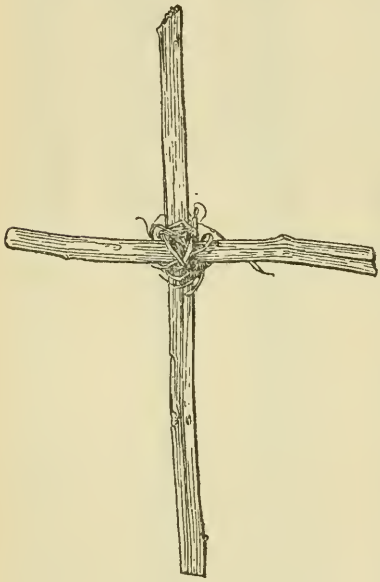


FIG. 336.—CROSS PAHO FROM SAN FRANCISCO RIVER.

A number of bowed sticks (figs. 1–6, pl. 25), found in Bear Creek Cave, were identified by Stewart Culin as tipcat sticks. Figure 1 is cut out and scarfed at intervals to secure an even bend and the other sticks are scarfed on one side. They are painted in ceremonial colors—red with black bands near either end. Length, 6–8 inches. (Cat. Nos. 246025, 246361, U.S.N.M.) Several of the sticks show traces of a wrapping which was bound around the middle. Other objects connected with games are shown in the section on stone, page 21, and it is probable that certain rings (pl. 12) and other specimens in the collection may be related to games.

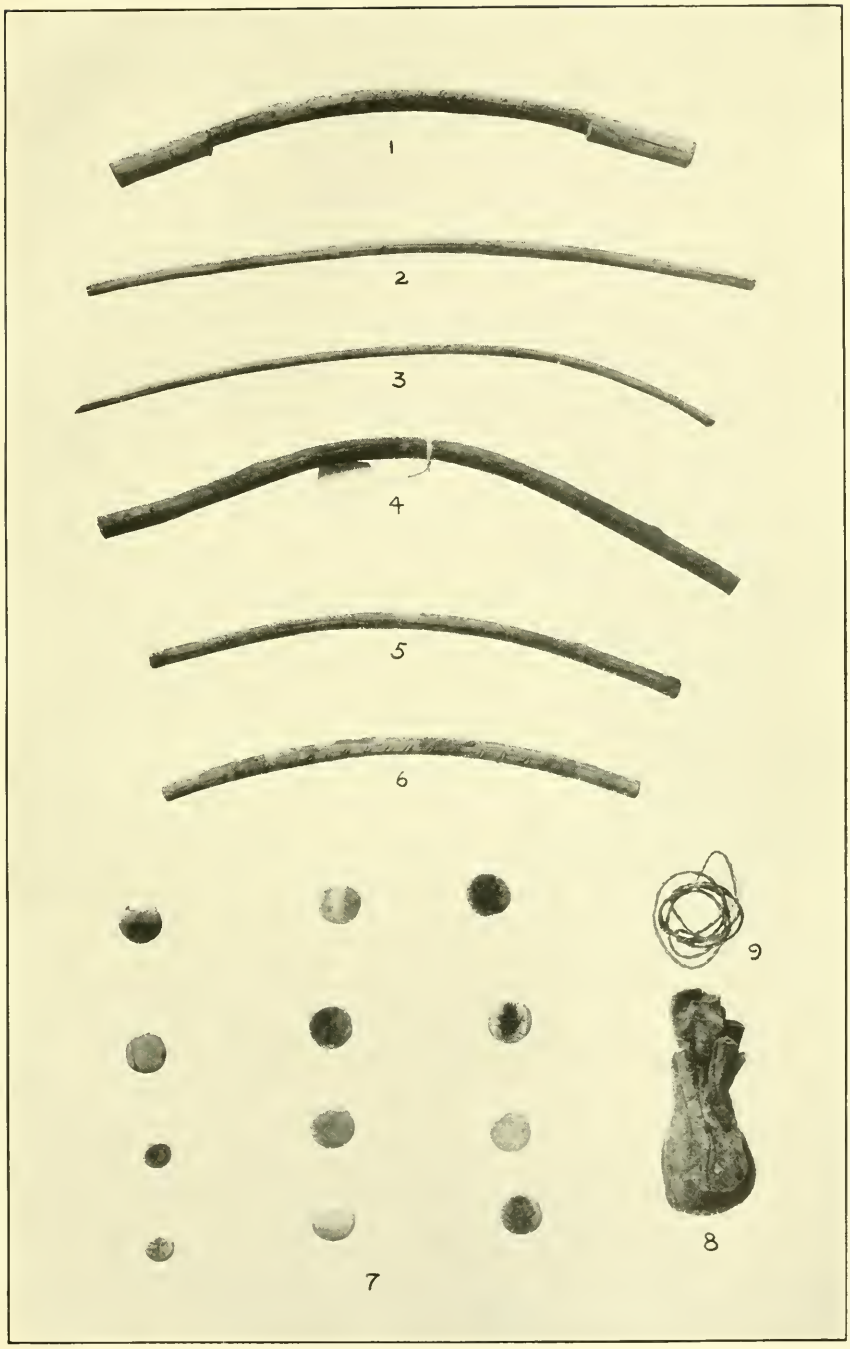
### MISCELLANEOUS PAHOS.

A paho in the form of a cross was found in a small cave on the San Francisco River, a short distance above the mouth of Blue River, Arizona. It is composed of two halved stalks of yucca, the shorter tied at right angles on the longer by means of wrappings of yucca leaf strip. (Fig. 336.) Cross offerings are known in the rituals of the present Pueblos, where they represent the sky being (star, heart of the sky). (Cat. No. 246554, U.S.N.M. Dimensions, 12½ inches by 7¼ inches.) The Pueblo cross was observed by the early Spanish explorers.[3]

[1] 22d Ann. Rept., Bur. Amer. Ethnology, p. 101.

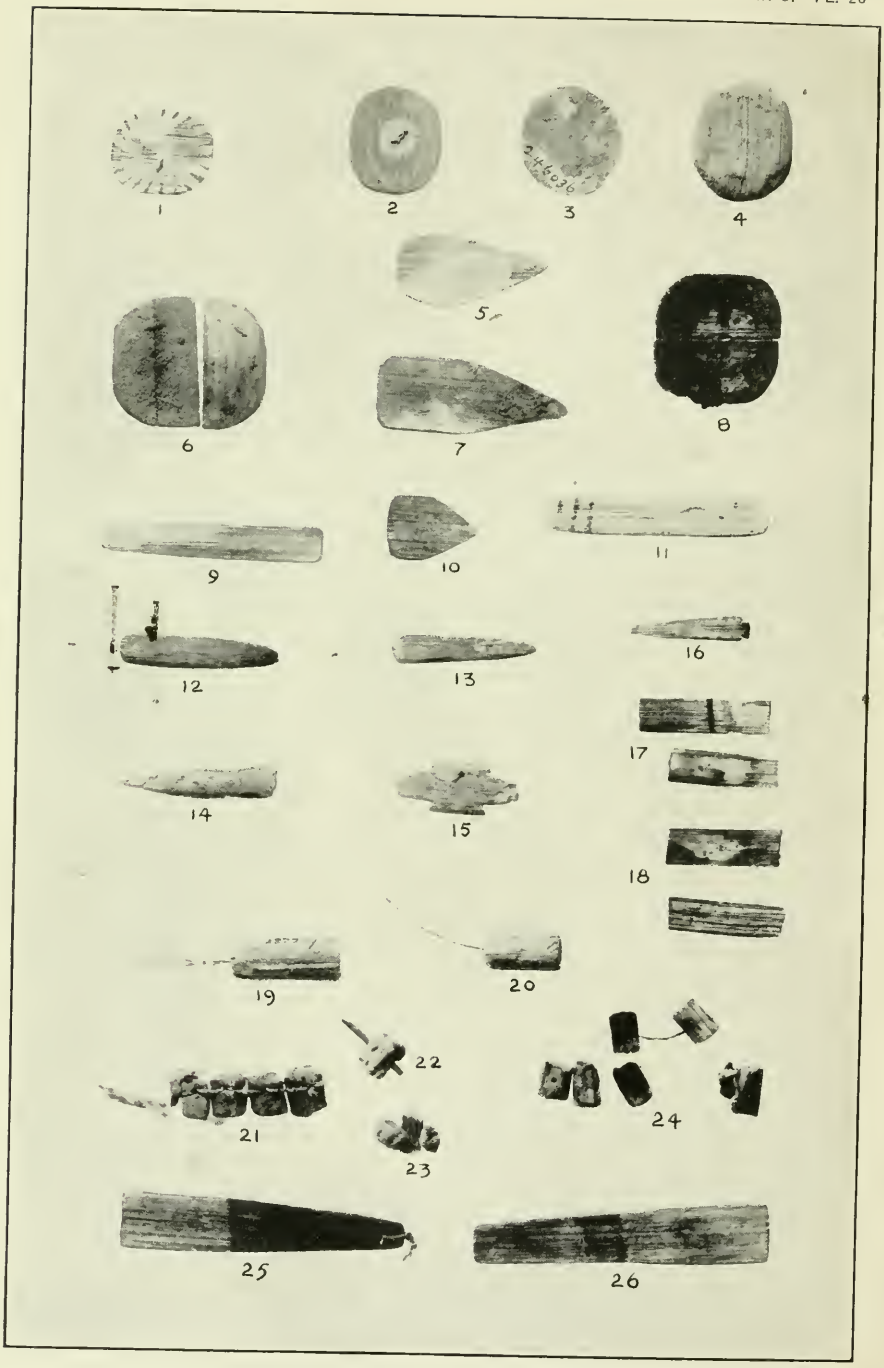
[2] 25th Ann. Rept., Bur. Amer. Ethnology, p. 165.

[3] The Coronado Expedition, 16th Ann. Rept., Bur. Amer. Ethnology, pt. 1, pp. 518, 544, 548, and 555.




GAME PAHOS AND GAME SET.

FOR EXPLANATION OF PLATE SEE PAGE 128.




PAINTED WOOD AND PITH OFFERINGS.

FOR EXPLANATION OF PLATE SEE PAGE 129.

Snake pahos were offered in the springs by the ancient Pueblos and fragments of these votive objects have been recovered. A specimen of snake paho in the National Museum comes from the head of Eagle Creek, Arizona. It is formed from a crooked root, smoothed and painted with bands of black and green on one side, with grooves and black and red stripes on the other side. (Fig. 337.) The head of this interesting object is missing. The specimen was found in a cave by Bryan D. Horton and is without doubt an offering. (Cat. No. 2161, U.S.N.M. Length, 10 inches.)

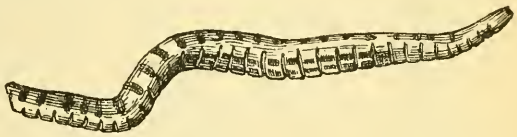


FIG. 337.—SNAKE PAHO FROM EAGLE CREEK.

From Tularosa Cave, New Mexico, was secured a section of reed, the lower end closed by the septum and the other formed with a flap that has been bent over with heat. (Fig. 338.) A band of burnt decoration is drawn below the hilum. The use of this curious vessel is not known, but it may have been an offering. (Cat. No. 246292, U.S.N.M. Length, 4½ inches.)

Great quantities of slender dressed rods the length of a bow and one-fourth inch in diameter, painted in red, black, white, blue, green, and yellow, usually in simple patterns, were found in the Bear Creek and other caves. Some of these rods were found attached to bows of standard size deposited against the back wall of the cave. They remind one of the rod of the War God altar of the Zuñi figured by Mrs. Stevenson.[1] A great deposit of these rods was found in a cave on the Gila near Solomonsville, Arizona, by Dr. J. Walter Fewkes.[2] Their use and meaning is conjectural. Occasionally they were bundled as torches. (See fig. 246.)

FIG. 338.—REED PAHO FROM TULAROSA CAVE.

A number of objects made of thin strips of wood and masses of pith and painted are grouped on plate 26. Figures 9, 11, 25, and 26 represent bull-roarers, not differing in shape from those used at present by the Hopi and Zuñi. Figures 21 to 24 are masses of pith of Ambrosia painted red and spitted on a wooden splint or sewed together with yucca cord arranged in series or set at right angles. They appear to be related to the frog spawn pahos of the Hopi. Figures 19 and 20 are pith cylinders into the axis of which at one extremity is fixed a yucca cord. Their meaning has not been ascertained. The meaning of the small painted rectangular tablets (figs. 17–18) is also conjectural. Figures 1–4, 6, and 8 represent flowers

[1] 23d Ann. Rept., Bur. Amer. Ethnology.
[2] 22d Ann. Rept., Bur. Amer. Ethnology.

or sun disks. One of these drawn in detail is shown in figure 221. It is made of two pieces of thin wood, sewed to a crosspiece and painted black, red, and green, and is probably part of a miniature headdress or mask representing a flower or sun shield. (Cat. No. 246580, U.S.N.M.; diameter, 1½ inches.)

FIG. 339.—ORNAMENT OF VOTIVE OFFERING FROM BEAR CREEK CAVE.

A painted stone slab (fig. 51) was found in a ceremonial room at the Spur Ranch near Luna, New Mexico, together with tubular pipes (see fig. 258), and other objects related to cult. It is alternately banded with red and black over ends and back which reminds one of the striping on the body of some of the Hopi tihus or so-called "dolls."

ORNAMENTATION OF OFFERINGS.

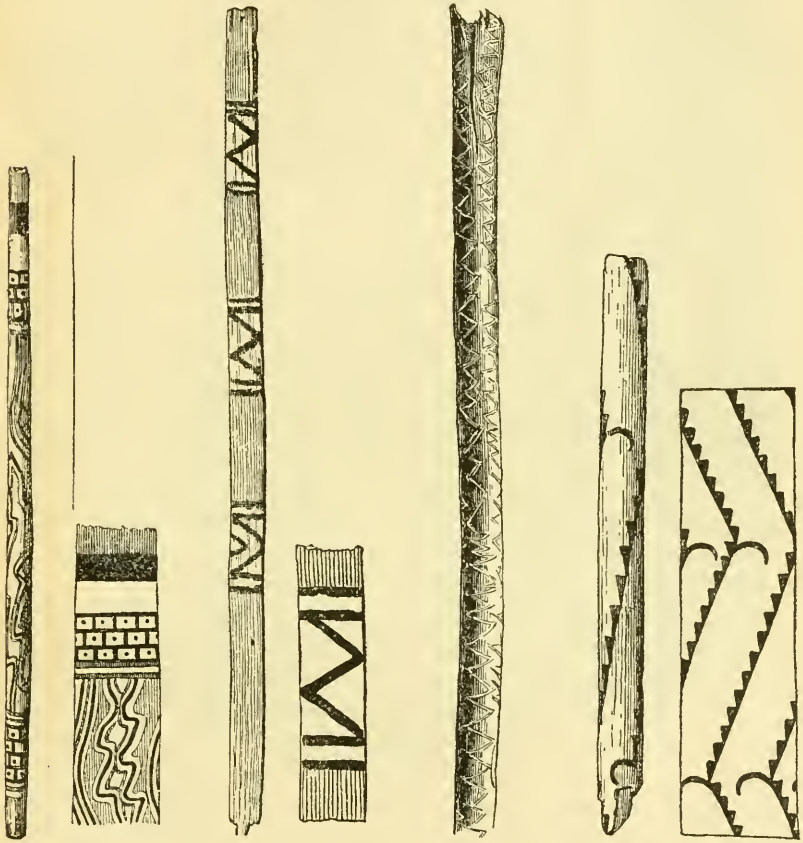
The ornamentation of these offerings is interesting both from its variety and from the way in which the difficulties of applying a connected pattern to round and irregular surfaces had been met. As a rule the ornamentation is in bands, which offers the simplest method of decorating a rod (fig. 339), but often they are in the form of snake-lightning, zigzags or more complicated ornaments, shown in figure 340. One very beautiful design from a fragment of a rod is shown in figure 345, 345 *a*. Another pleasing design is shown in figure 341. Sometimes a complicated design occurs on a rod, as shown in figures 342, 342 *a*. The painting is in black, green, red, and white, the colors bright and pleasing. The designs on the rods are like those on the arrows for which in some instances the rods appear to stand. (Cat. No. 246000, U.S.N.M.; Bear Creek.) Figure 340 is 16 inches long. Decorations on flat objects are shown in figures 343, 343 *a*, and on the decorations of the tablets. A curious decoration formed by scratching zigzag lines in blackened wood is shown in figure 344. (Cat. No. 245999, U.S.N.M., Bear Creek Cave.)

FIG. 340.—ORNAMENT OF VOTIVE OFFERING FROM BEAR CREEK CAVE.

FIG. 341.—ORNAMENT OF VOTIVE OFFERING FROM BEAR CREEK CAVE.

In other cases a design is made by winding a band around a rod and smoking the exposed areas. Very smoothly worked and accurately

calibrated rods were often decorated with a pleasing design in black. (Fig. 345.) The completed design is remarkable for its accuracy of execution and the care with which it was applied to a cylinder. (Fig. 345 *a*.) (Cat. No. 246000, U.S.N.M., Bear Creek Cave. Length, 8 inches.) Another specimen is decorated with geometric designs in black. (Fig. 346.) The design spread out, shown at *a*, consists of a band of black and white checker, a band of crossing




342. 343. 344. 345.

FIGS. 342–345.—ORNAMENTS OF VOTIVE OFFERINGS FROM BEAR CREEK CAVE.

diagonals forming diamonds, and a band of frets. (Cat. No. 346000, U.S.N.M., Bear Creek.) Figures 347 and 348 show zigzag patterns in black, applied very evenly and accurately. (Cat. Nos. 246050, 246000, U.S.N.M., Bear Creek.)

The colors are often in black, green, red, and white, and being the natural earths they remain bright for a long time. It is interesting to observe that there was evident appreciation by the

ancient Blue River tribes of the shades of the various ores and earths employed for paint, and it appears that there was studied endeavor in many cases to combine colors in decoration to produce an æsthetic effect. These efforts in natural colors were doubtless pleasing to the eye of the Indian, and for the same reason may be approvingly viewed by the artist of to-day. Necessarily the vast majority of the works of the Indian artist illustrating his taste and skill as a designer and decorator have perished, but enough remains to prove his ability in the lines and to show the care with which he had selected the greatest range of colors which his environment would furnish.

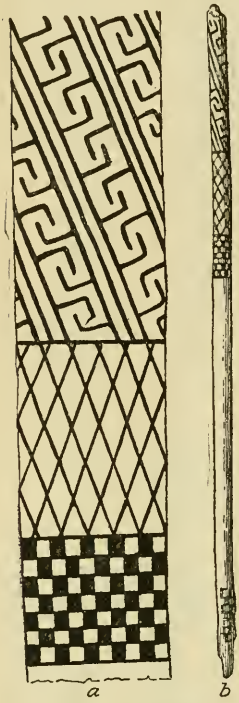



FIG. 346.—ORNAMENT OF VOTIVE OFFERING FROM BEAR CREEK CAVE.

### MORTUARY.

Several burials had been made in Tularosa Cave, but most of these were anciently disturbed and only parts of bodies could be found. One burial, in the upper layers near the front of the cave, was removed by John Averitt, a forest ranger, and came into the possession of W. J. Andrus, of Hackensack, New Jersey. On the dried trunk of a body from the cave was a feather jacket tied with hair cord and a loin band consisting of a bundle of cords dyed purple. (See fig. 150.)

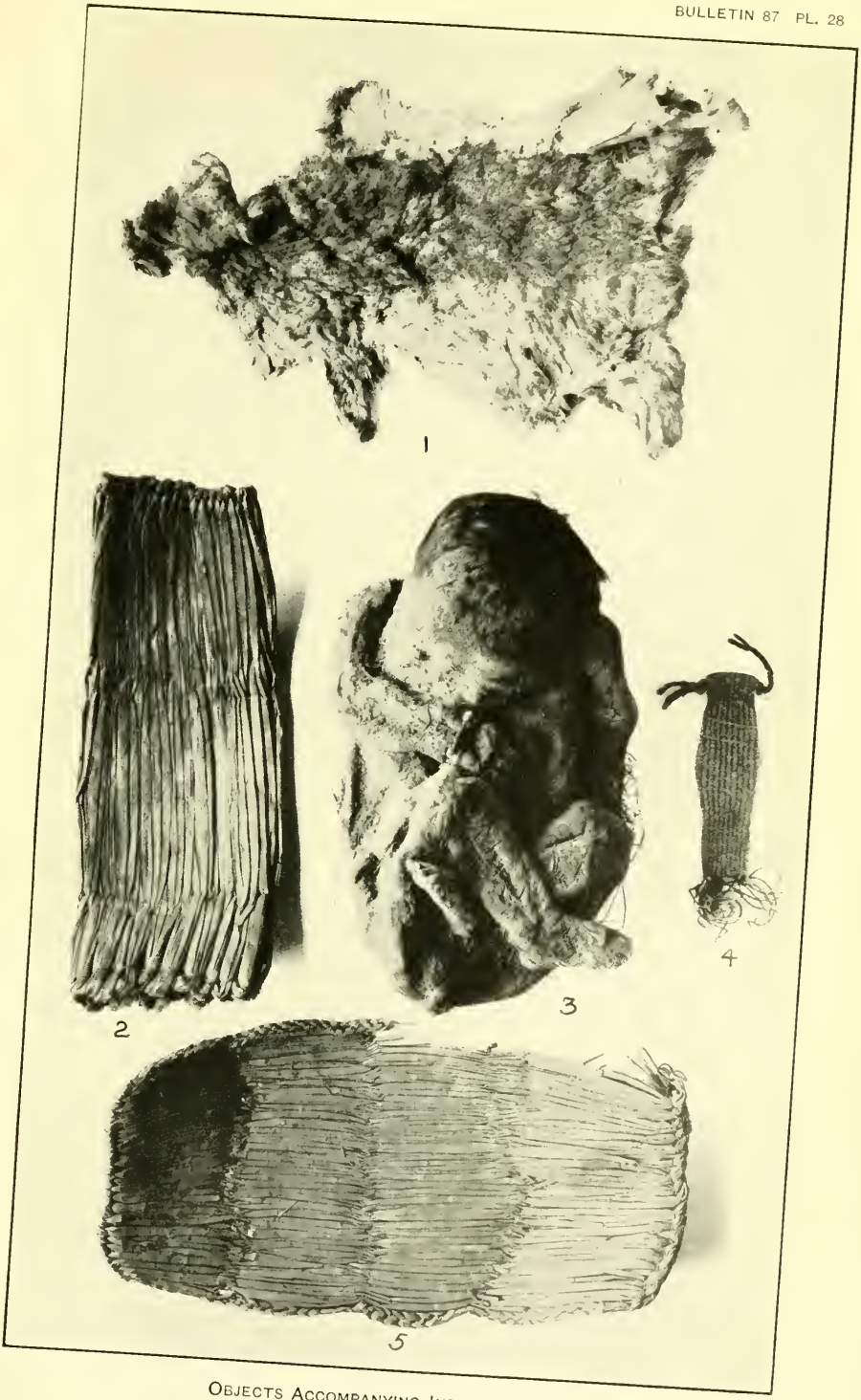
During the exploration of the cave by the Museum-Gates expedition in 1905, the desiccated body of an infant was found buried deep in the débris near the bottom of the cave. (Pl. 27, Cat. No. 923, Gates collection.) The body lay on a rush mat, and over it was laid another rush mat doubled, and the whole burial inclosed in dry grass. A bracelet of olivella shell beads encircled the right wrist. The objects connected with the burial are shown in detail on plate 28, figure 1, antelope skin; figure 2, double mat; figure 3, body of infant doubled up into a small compass; figure 4, woven object whose use is not conjectured; and figure 5, a well-made cradle mat of rush. The specimen figure 4 is of gray hair of dog or mountain goat close woven on yucca cord. It is tubular, and a broad loop is woven at one end in which is rove a cord of buffalo hair knotted on either side to prevent it slipping

FIG. 347.—ORNAMENT OF VOTIVE OFFERING FROM BEAR CREEK CAVE.

FIG. 348.—ORNAMENT OF VOTIVE OFFERING FROM BEAR CREEK CAVE.

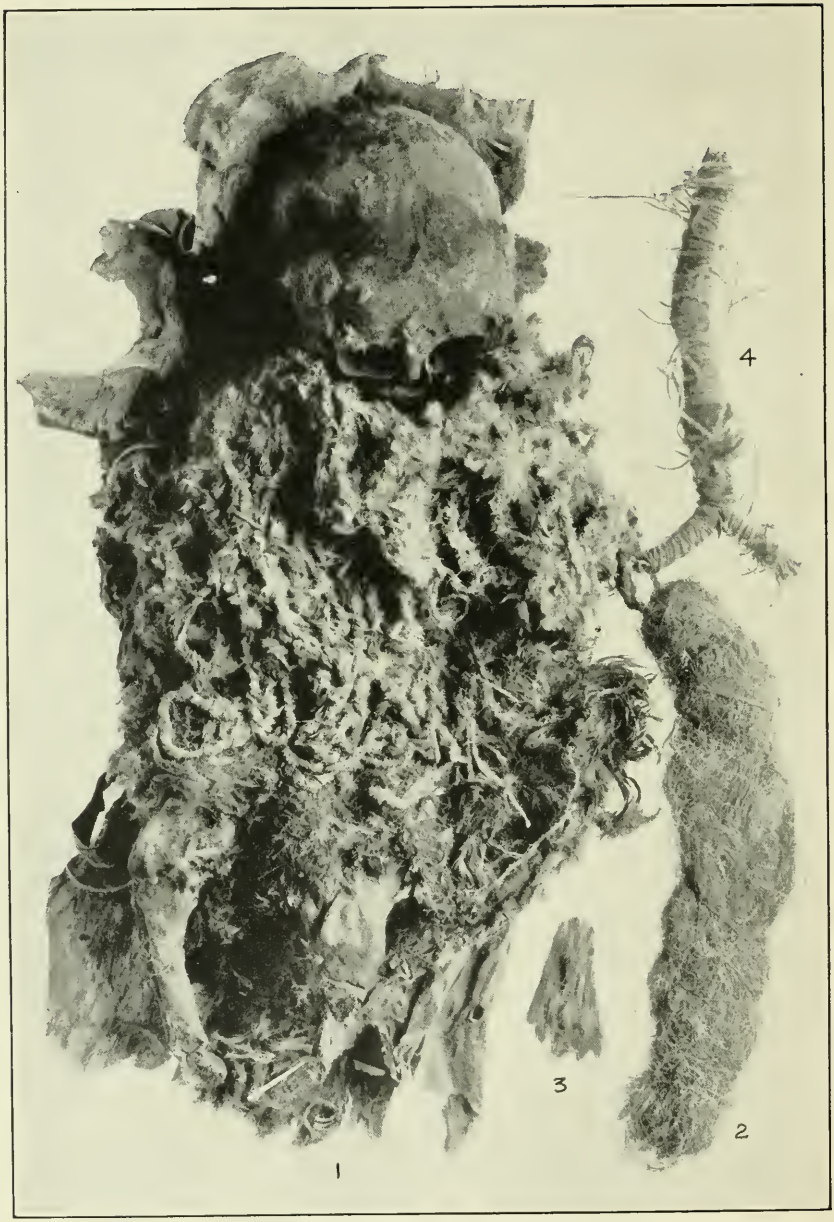
DESICCATED BODY OF AN INFANT BURIED IN TULAROSA CAVE.

FOR EXPLANATION OF PLATE SEE PAGE 132.




OBJECTS ACCOMPANYING INFANT BURIAL.

FOR EXPLANATION OF PLATE SEE PAGE 132.




DESICCATED BODY OF AN INFANT.

FOR EXPLANATION OF PLATE SEE PAGE 133.

through. It is possible that the object is a child's doll or toy, on which much labor had been expended.

Mr. A. J. Connell, acting forest supervisor of the Gila National Forest, sent to the Museum, through the United States Department of Agriculture, a mummy of infant from a cave on the West Fork of the upper Gila River called Gila Cliff Dwelling. This mummy (pl. 29, fig. 1) is of a child a few months old. It lies on a wildcat skin, and was so buried in the débris of the cave. With the body is a hank of fiber of yucca (fig. 2) held by a winding of yucca cord, and an object, apparently a doll (fig. 4), made of a core of cord, the material of which appears to be the wool of the mountain goat. A small mass, apparently dried food, and a small section of wildcat skin (fig. 3) also accompany the mummy. The clothing consists of a sleeveless jacket of rabbit fur and a waist garment in form of a band made of pretty downy feathers of the blue jay and other birds. This band is wrapped around the body, and at one extremity is attached a rabbit-fur band which passes between the legs and is secured by a cord on the other end of the band. The weaving of both the garments is on fiber cord; the rabbit skin is cut in strips, twisted and held in place by twined weaving. The doll and mass of fiber (doll bed) were found close to the body. Some needles of longleaf pine were with the mummy. The burial was as in that described in the Tularose Cave in a bed of grass and was covered with cinders and débris from the walls of the cave. (Cat. No. 273340, U.S.N.M.)

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